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THE FISHERIES OF INDONESIA

FISHERY LEAFLET 396

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THE FISHERIES OF INDONESIA

by
R. H. Fiedler

THE FISHERIES OF INDONESIA

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THE FISHERIES OF INDONESIA

by
R. H. Fiedler
Chief, Fisheries Branch
Economic Cooperation Administration
Mission to Korea 1/

Foreword

The Indonesian archipelago extends over an expanse which is practically comparable in length (west to east) to the distance between San Francisco Bay and Bermuda, and in width (north to south) to the distance between the north end of Lake Michigan and the mouth of the Mississippi River. Included in this area are tens of thousands of square miles of probable fishing grounds. As a rule the fishes in these waters are far more numerous in species, but fewer in the quantity of each species, in comparison with those in temperate or artic waters. As a consequence some ninety or more species appear in the commercial catch, with few being at all preponderant. While the waters of Indonesia cover a large expanse, commercial sea fishing is prosecuted mainly along a narrow band off the coasts of the various islands, with operations being concentrated off northern Java. Indonesia also has fisheries of considerable importance in her lakes, rivers, swamps, and artificially made ponds. The principal fishing areas are shown in Map No. 1.

Fisheries in Indonesian waters are of long standing, but it is only in recent years that the Government has made an intensive effort to modernize fishing techniques and to improve the welfare of those engaged in the fishing industry. The following report aims to give a brief account of the present fishing industry and further programs of the National Government to increase fish production through modernizing the industry and developing new fishery industries based on latent fishery resources within the area and to improve the social and economic status of fishermen.

This report is based on information obtained by the writer during the course of his visit to Indonesia from the middle of August to the middle of October 1950 while on detail to the ECA Mission to Indonesia from the ECA Mission to Korea at Seoul.

The writer wishes to express his thanks to the many Indonesian Government officials and other people in Indonesia who supplied technical information and other assistance during the conduct

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1/ On detail to the Special Technical and Economic Mission to Indonesia of the Economic Cooperation Administration in connection with the Food and Agriculture Program.

of the survey and in the preparation of this report. It is desired especially to thank Dr. R. Pranjoto, Chief of the Sea Fisheries Service, and Dr. J. K. de Jong, the Counsellor of the Service, and their staff for their assistance. They were invaluable in supplying historical and current details on the fishery industry and its problems and in fishery administration in Indonesia, in the preparation of the maps showing the location of the Indonesian fishery resources and fishery administrative areas and in furnishing various illustrations. Very valuable assistance was given also by Dr. J. D. F. Hardenberg, Chief of the Laboratory for Investigation of the Sea, Dr. A. E. Hofstede, Chief of the Inland Fisheries Service, and their staffs in supplying scientific and industrial information and illustrative material.

The writer also is appreciative and wishes to thank the Hon. H. Merle Cochran, American Ambassador to Indonesia, for his timely advice and cooperation during the survey, and for the assistance of various members of his staff in facilitating the survey. The writer is indebted also to the various members of the Special Technical and Economic Mission of the Economic Cooperation Administration to Indonesia for assistance on administrative and technical matters, and in typing the manuscript of the original report submitted to the Far East Program Division of ECA in Washington, D. C.

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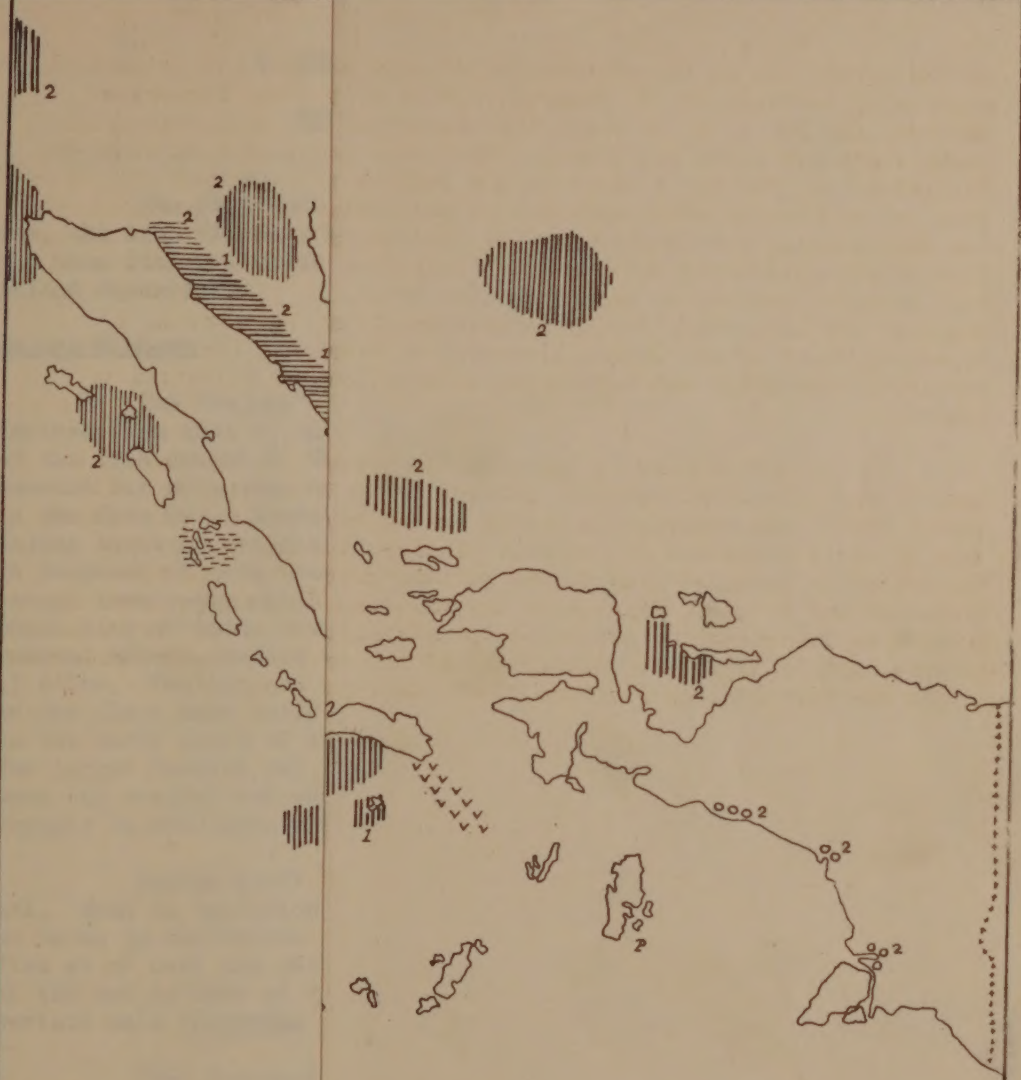
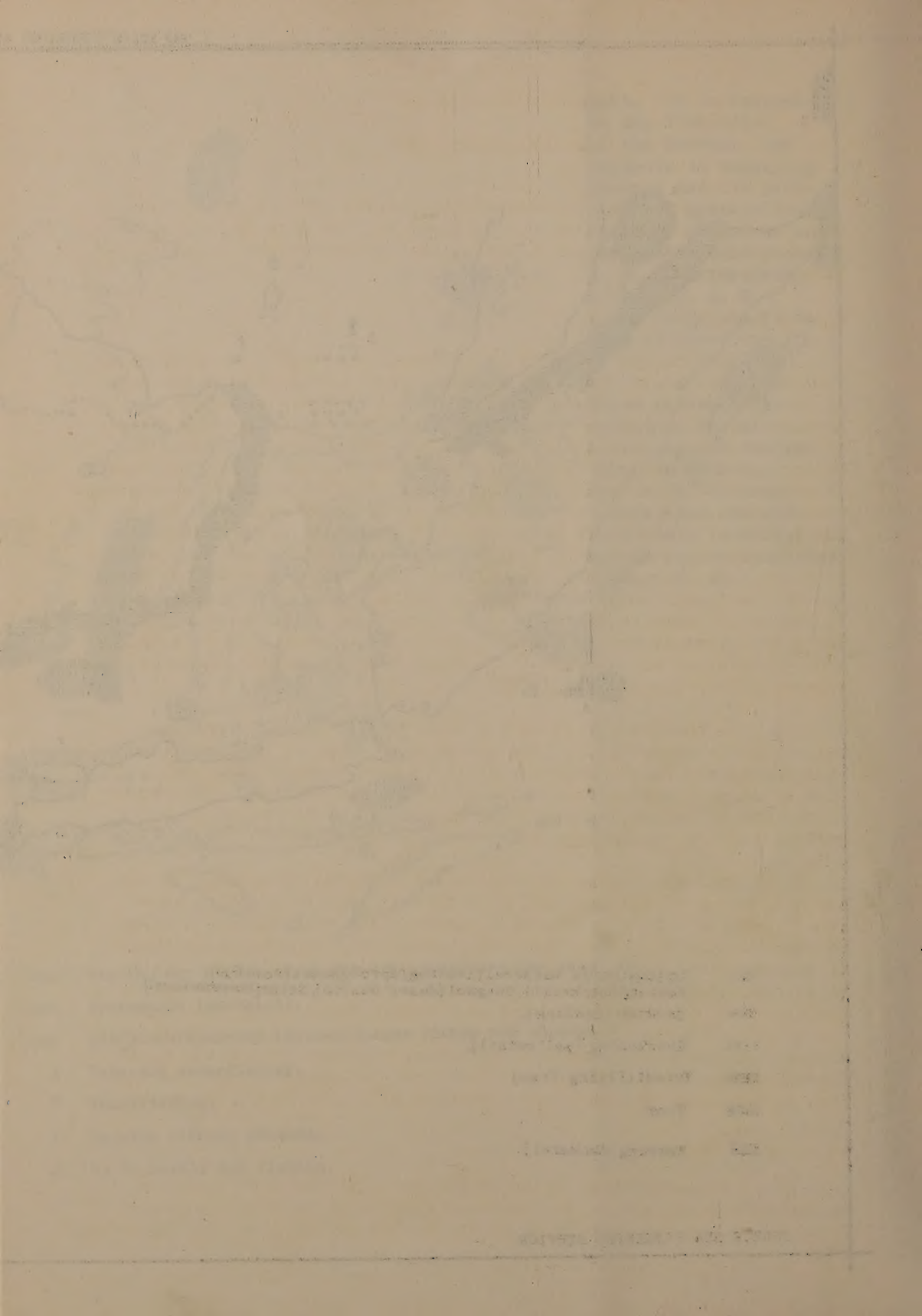


SOURCE: SEA FISHERIES



I THE FISHING INDUSTRY

Principal Fisheries

The principal fisheries of Indonesia are the majang fishery, the trap fishery, that for flying fish, the reef fisheries, the tuna fishery, which is in the process of development, and the inland fisheries.

Majang Fishery

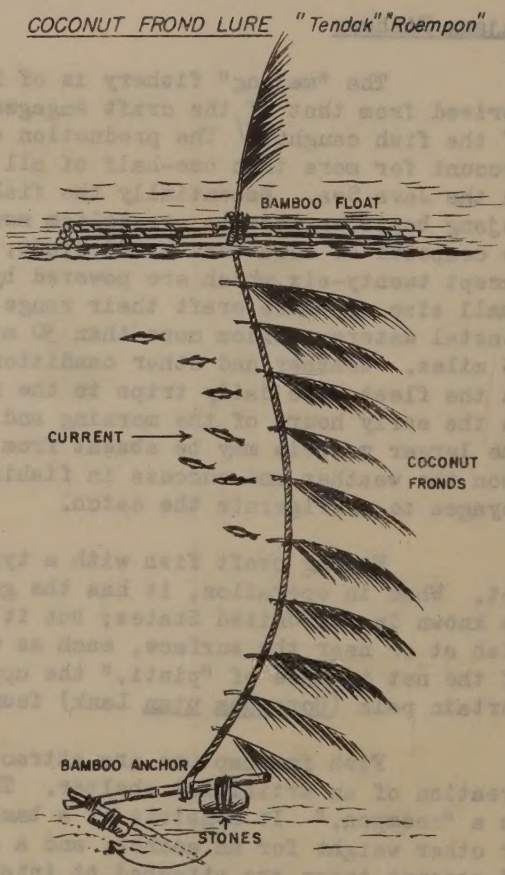
The "majang" fishery is of first importance; its name being derived from that of the craft engaged therein, rather than the name of the fish caught.[2/] The production of this fishery is said to account for more than one-half of all the fish caught by Indonesians in the Java Sea. Essentially the fishery employs small craft, as majang boats or vessels are seldom more than 35 feet long. The fleet is composed of more than 4,000 craft, all of which are sail or rowboats except twenty-six which are powered by 15 to 20 HP engines. Due to small size of these craft their range of operation is limited to coastal waters, seldom more than 50 miles from shore, but mostly about 15 miles. Weather and other conditions permitting, the smaller boats in the fleet make daily trips to the fishing grounds, departing port in the early hours of the morning and returning a little after mid-day. The larger vessels may be absent from port for several days depending upon the weather and success in fishing. Ice is carried on these longer voyages to refrigerate the catch.

Majang craft fish with a type of gear called a "pajang" net. When in operation, it has the general shape of an otter trawl, as known in the United States; but it is used to surround schools of fish at or near the surface, much as with a purse seine. The twine of the net is made of "pinti," the upper skin of the stem of a certain palm (Corrypha utan Lank) found in Indonesia.

Fish for capture are attracted or lured in schools by the creation of an artificial shelter. This is made by a device known as a "roempon." It consists of a bamboo float with marker, a stone or other weight for an anchor, and a connecting rope to which fronds of coconut trees are attached at intervals along its length. This is set in water-depths about equal to the length of the rope and when in place it somewhat resembles a tree. Each majang boat uses two to ten of these roempons, depending upon their size and locality fished. The roempons remain at sea about six days before the first fishing takes place. After that they are fished once every two days. When in continual use this way a roempon will last about one month.

2/ A detailed description of the majang fishery is contained in "De Beoefening der Majang Zeevisscherij Langs de Noordkust Van Java" by H. van Pel, published by the Sea Fisheries Service. Djakarta. 1938.

After the roempon is in place it is the tendency of the fronds to lie horizontal in the water and drift to that side of the rope opposite the oncoming flow of the current. Fish then congregate in schools on the other side of the rope heading into the current. When it is believed that sufficient fish have collected in front of the roempon to make a profitable haul the roempon is removed and the pajang net is paid out into the water as the majang boat circles ahead of the school. The net is then towed through the water and the fish are captured in the bunt of the net. The most important species caught are lajang, bawal, selar, tembang, kembung and tonkoe.



Trap Fishery

The second most important fishery is that using traps, locally called "sero."3/ These are of many designs and shapes and are fished in a manner similar to those used in America. They capture many kinds of fish, including kembung, bawal, anchovies, sardines, sprat, spanish mackerel, horse mackerel, and milk fish. There are said to be thousands of these traps of all sizes fishing in Indonesia.

3/ For a description of this fishery see "Sero dan Tegur" by Amirroedin. Sea Fisheries Service. Djakarta. 1949.

SERO or BANDJANG

Fishery for Flying Fish

This fishery is of third importance from the standpoint of volume. The fish are caught in a rather unique manner. In areas where they occur and during the spawning season, floating traps are placed in the water near masses of seaweed. As the flying fish skim over the surface of the seaweed to lay their eggs they attempt to avoid the seaweed in submerging and plunge into the trap.

Reef Fisheries

Reef fishing is also of importance in the capture of fish in Indonesia.4/ As its name implies, the fishery is conducted on reefs, the fish being caught in fixed nets (muro-ami) into which they have been driven by divers. It is a very effective fishery as has been demonstrated by the fact that a given area can be cleaned out of fish in a very short time. There are seven of the net and diving units in this fishery and three motor vessels. The principal species captured are yellowtails.

4/ For a description of this fishery see "Penangkapan Ikan Ekor Kuning di Pulau Pulau Sekitar Pulau Billiton" by R. Soelaeman Natadisastra. Sea Fisheries Service. Djakarta. 1950.

Tuna Fishery

A tuna fishery is in the stage of development in eastern Indonesian waters by the Sea Fisheries Service of the National Government. In doing so the Service is carrying forward explorations initiated by the Japanese which revealed that tuna are to be found in these waters in sufficient abundance at certain seasons of the year to form the basis of a commercial fishery.

The tuna fishing fleet of Indonesia, at the present time, consists of fourteen motor vessels ranging from 12 to 20 meters long. These are all hook and line bait vessels. Seven of these, around 14 to 18 meters in length, operate out of Aertembaga. Of these, three are operated by a private firm and four by the Sea Fisheries Institute. The latter were to be sold by the Institute in November 1950 to a cooperative association of fishermen at Aertembaga. One vessel, about 12 meters long, is operated by a private firm out of the port of Ternate. There were six tuna vessels of 16 to 20 meters long operating out of Ambon. Four of these were operated by private interests and two by the Sea Fisheries Institute.

Catches are consisting mainly of skipjack, although some yellowfin and bluefin tuna have been taken. There has been some difficulty in getting live bait, but this problem has not proved too serious. The fishing season extends from around March or April to December, during which time the vessels can operate about two hundred days. The tuna seem to be found fairly close to shore, not over five hours' travel time from port. Thus the vessels can make daily trips, and it is said no ice is needed to refrigerate the catch on these voyages. Experts of the Sea Fisheries Service say that ice is unnecessary on these daily trips because the tuna will remain in perfect condition for at least eight hours after capture. A day's catch is averaging about 1.5 metric tons per vessel.

The stocks of tuna being drawn upon are said to be migrating west in the vicinity of the equator, north of New Guinea, and then to dip south into the Halmahera and Molucca Seas. Some pass west to the Celebes Sea and then south into Makassar Strait. Spawning is said to take place in the Banda Sea.

Tuna catches landed at Aertembaga and Ternate are sold at public auction markets. Most of the catch is smoked soon after landing. That smoked at Aertembaga is marketed throughout Minahassa, the northern peninsula of Celebes, and that at Ternate in the Halmahera Islands.

Other Sea Fishing Methods and Fisheries

Other important methods of fishing are by beach seines, haul seines, gill nets, scoop nets, cast nets, hook and line, and bamboo pots. Some bottom trawling has been done in the vicinity of Makassar. Catches, however, have consisted mainly of sharks and rays

and small types of fish which are considered of poor quality. Mid-water trawling is being tested, primarily to catch "kembung," a highly prized fish in Indonesia.

The use of purse seines does not seem warranted in Indonesian waters because the schools of fish are small in comparison with schools found in the waters of temperate climates. There is a possibility, however, that this type of gear might prove successful in catching skipjack and sardines. Experiments are planned in this direction by the Sea Fisheries Service.

There are rather productive pearl and trochus fisheries in waters of eastern Indonesia. These are conducted by divers. Figures are not available on the output of shells, but since most of them are exported an idea of the output may be deduced from figures on the exports of this product from Indonesia. In 1949 these amounted to 3,657 metric tons compared with 1,200 to 2,500 metric tons in the immediate prewar years. (See Table No. 9, page 29.) The shells are assembled at various ports, mainly Makassar.

Pearl and trochus shells are used for making buttons, knife handles, and other mother-of-pearl novelties. Natural pearls are also found in the pearl fisheries.

Inland Fisheries

There are very extensive inland fisheries in Indonesia conducted in rivers, lakes, swamps, and artificially made ponds. Catches are made with cast nets, seines, and other types of textile gear and with various types of traps and pots.

View of brackish-water fishponds, the reconstructed "Heemraad" plot, near Djakarta.

It has been estimated that in Borneo some 12,500,000 acres of swamp are suitable for fishing, and in Celebes some 800,000 acres of swamp and 400,000 acres of lakes. In Sumatra swamps cover an area of some 22,000,000 acres and lakes about 400,000 acres. The fisheries in the latter waters are exploited only to a small extent now because of the shortage of fishermen. On Java and Madura there are some 550,000 acres of swamps and on Bangka Island about 400,000 acres.

Catching of marketable bandeng in a brackish-water fishpond by means of bamboo screens (East Java).

There is a large production of fish in salt-water ponds, called tambaks. According to Schuster5/ about 250,000 persons are engaged in tambak culture in Java and Madura alone. These "farmers" cultivate some 80,000 hectares, producing some 15,000 metric tons of fish annually. The principal species of fish raised is the bandeng (Chanos chanos), a fish resembling herring. This fish does not spawn naturally in the ponds so it is necessary to stock them each year with the fry of this fish caught in the sea. In the course of eight to ten months the fry grows into a marketable fish, weighing 300 to 800 grams. If they are allowed to remain in the ponds a year or longer they will attain a size of one to three kilograms.

Tambaks are also used for raising mullet catfish, snappers, eels, prawns, and crabs. The young of these species enter the tambak naturally at high tide. The average annual production of a tambak is about 70 kilograms of fish per acre.

5/ "Fish culture in salt-water ponds on Java." By W. H. Schuster. Sea Fisheries Laboratory. Djakarta. 1949.

Curing of fresh-water fish in brine. It is common practice to use a small prahu for this purpose. Tempeh Lake.

After the curing in brine the fish are dried in the sun. Tempeh Lake.

Many of the tambaks now in existence are in a bad state of repair or originally were improperly built. Some may be too high above the water level so that they cannot be filled properly with sea water. In other cases they may be filled with silt, thus reducing the water area.

It is now very expensive to build or repair a tambak because of high labor costs. Prewar, labor received .15 Dutch guilders per day for this work compared with two to five Indonesian guilders or rupiahs per day now. In order to reduce labor costs the Inland Fisheries Service is planning to experiment with mechanical earth movers and dredging equipment to accomplish the job.

The ownership of the tambaks is mainly with individuals, (95 percent). The remainder are owned by the Government. These are used for experimental purposes. Prewar, one hectar of tambak was valued around $100 to $500. Value depends upon such factors as productivity, nearness to and adequacy of transportation facilities to consuming markets, ability of the pond to hold water, and adequacy of water supply.

Tambaks are a familiar and interesting sight along the coast of many parts of Java. In certain areas they are very numerous.

Large quantities of fish, mainly for home consumption, are raised in fresh-water ponds and paddy fields (sawahs). These fresh-water ponds yield an average of some 250 kilograms per acre per year; some producing even up to 5,000 kilograms per acre per year. Average yields in the paddy fields are 15 kilograms per month per acre.

Catching of fish in Government brackish-water fish-pond near Djakarta by means of cast-nets.

The fresh-water ponds, individually, are generally very small in size, some covering only a few square yards. However, in total, there are some 20,000 acres of these ponds in Java, and in addition, some 166,000 acres of paddy fields are used in this Island for raising fish.

Fishing Craft and Fishermen

Fishing Craft

The fishing fleet of Indonesia is comprised almost entirely of sail and rowboats. The total number of units in the fleet is unknown. However, it must be of considerable size since the Sea Fisheries Service estimates that in 1949 some 19,000 craft operated out of Java and Madura alone. Before the war there were 32,000 craft here, and in 1947 there were 21,600. Some 6,000 of these operated along the north coast of middle Java, being engaged primarily in the majang fishery. (See Table No. 1.)

The catching of bandeng (Chanos chanos) fry in East Java.

TABLE NO. 1: PRODUCTION OF THE SEA FISHERIES OFF THE NORTH COAST OF MIDDLE JAVA, 1937 TO 1940 AND 1949 A/

APPARATUS	1937 M.T.	1938 M.T.	1939 M.T.	1940 M.T.	1949 M.T.
MAJANG BOATS					
OFFSHORE FISHERIES	6,015	4,098	6,285	7,454	B/
SHORE FISHERIES	5,171	5,333	6,774	7,334	B/
OTHER BOATS	6,774	9,414	9,522	10,508	B/
TRAPS (SERO)	399	371	458	485	B/
TOTAL	18,359	19,216	23,039	25,781 C/	18,821 D/
NUMBER OF SAILING BOATS IN ABOVE FISHERY	B/	5,957	6,257	6,750	B/

A/ "MIDDLE JAVA" REFERS TO THE AREA ROUGHLY BETWEEN SEMARANG AND CHERIBON. THIS IS THE AREA TO WHICH IT IS PROPOSED TO ALLOCATE SOME MOTORIZED MAJANG VESSELS.
B/ DATA NOT AVAILABLE.
C/ THIS IS ABOUT ONE-FOURTH OF THE TOTAL CATCH OF THE SEA FISHERIES OF JAVA IN 1940.
D/ THIS IS ABOUT ONE-THIRD OF THE TOTAL CATCH OF THE SEA FISHERIES OF JAVA IN 1949.

SOURCE: SEA FISHERIES SERVICE.

In the main, the fishing craft are small, few being more than 11 meters in length. These craft are classified in three size categories, viz: - 4 meters or less in length, 4 to 8 meters, and 8 to 11 meters. About 40 percent are in the latter category. (See Table No. 2.)

Of the total number of craft in the commercial fleet, only about forty-five are motorized. Of these, twenty-six are majang vessels fishing out of Djakarta, one is tuna fishing out of Ternate, six are tuna fishing out of Ambon, seven are tuna fishing out of Aertembaga and three are in the reef fisheries. About two motor boats are engaged in the pearl shell fisheries, and one is building for this fishery.

The craft in the fishing fleet are generally owned individually by a fisherman or a group of fishermen. Multiple ownership by one individual, group or concern is rather uncommon.

Fishermen

It is estimated that upwards to one million persons are engaged in the sea and inland fisheries of Indonesia, including both commercial and subsistence fishermen.

TABLE NO. 2

FISHING SAIL BOATS: JAVA AND MADURA

	LARGE	MEDIUM	SMALL
NUMBER (1940)	7,200	9,500	2,600
*LENGTH (METERS)	11	8	4
*BREADTH (METERS)	3½	2½	1½
*DEPTH (METERS)	1½	1	.60
*SIZE OF SAIL (M^2)	75	35	25
*GROSS TONNAGE (M^3)	9	4 - 9	To 3
*CARRYING CAPACITY (Kg)	1,000	750	50
CREW(NUMBER)	15 - 20	6 - 9	1 - 3
*AVERAGE CATCH PER DAY (Kg)	40	15	5

* THESE FIGURES ARE APPROXIMATE

SOURCE: SEA FISHERIES SERVICE

Indonesian fishing craft and fishermen are not licensed by the Government. Foreigners may engage in certain phases of the fishery industry within the territorial waters of Indonesia. To do so they must obtain a license, issued jointly by the Ministries of Foreign Affairs and Agriculture and Fisheries. Such licenses have been issued to persons from Singapore to engage in the fish-carrier trade. In other instances, licenses have been issued to foreigners to engage in the pearl and trochus shell fisheries. The Government charges a fee for these licenses.

Fishermen are prohibited from using dynamite or poison to capture fish, and in some areas coral fishing can be done only by permit from the governor of the area involved. The need for other types of conservation regulations has not yet become apparent.

Cooperative Associations of Fishermen

Cooperative associations of fishermen are authorized by the Government under an ordinance of 1927. At the present time there are some thirty-five such associations at as many ports, the names of which

are given in the following list. The activities of these organizations in the operation of public auction markets for fish will be discussed in a later portion of this report.

List of Cooperative Associations of Fishermen

Name	Location
Warnasari	Labuan (Banten)
Pulau Seribu	Pasar Ikan, Djakarta
Mino Sarojo	Tjilatjap
Saja Sumitra	Paoman Indramaju
Ngupaja Mina	Dadap Pos Karangampel Tjirebon
Walujadjati	Bondet (Tjirebon) Ketj. Tjirebon Utara
Tjondongsari	Astana(Tjirebon) Ketj. Tjirebon
Sugih Santosa	Bandengan (Tjirebon) Ketj. Astana Djapura Kew. Sdg. Laut.
Sugih Mulja	Tjitemu Sindanglau (Tjirebon)
Sugih Waras	Mendupesistir (Tjirebon)
Pabelah Bumiputra	Gebangilir
Misaja Mina	Eretan (Kandanghaur) Pos Losarang
Saja Sari	Sawodjadjar (Brebes)
Misaja Sari	Pemalang
Misojo Mino	Tegal
Mino Sojo	Wonokerto Pekalongan
Ngupojo Mino	Batang
Mino Srojo	Tawang (Weleri)
Mino Srojo	Bandengan (Kendal)
Misojo Ulam	Semarang Pendrikan 22
Mino Utomo	Wedung Demak
Mino Utomo	Morodemak (Demak)
Misojo Sariroso	Djepara
Sarono Sojo	Djuwana
Sarojo Mino	Taskiagung Rembang
Sarojo Mino	Sarang
Taman Mardi Mino	Karangsari Tuban
Trisno Mardi Mino	Bulu Tuban
Ngaglik	Tuban
Pagujuban	Majangan Pamanukan
Misaja Sampurna	Muara Tjiasem Sukamandi
Sugih Waluja	Ender Pos Tjiledug (Tjirebon)
Djatimulja	Limbangan Djuntinjuat (Indramaju) Pos Karangampel
Tjidjulang	H. Tadjudin Tjidjulang Kab. Tjiamis
Jajasan Perukunan Penangkap Ikan	Telokbetung

Fish Production

The fisheries of Indonesia yielded 420,000 metric tons of fish and fish products in 1949, according to estimates of the Government fishery services. Of this amount, 245,000 metric tons came from the sea fisheries and 175,000 metric tons from the inland fisheries. The yield in 1949 was some 50,000 metric tons less than in 1940 when it amounted to 472,000 metric tons, 325,000 metric tons coming from the sea and 147,00 metric tons from the inland fisheries. Further details are given in Tables Nos. 3 and 4.

TABLE NO. 3

ESTIMATED PRODUCTION OF THE SEA AND INLAND FISHERIES OF INDONESIA
1940 AND 1949
(IN METRIC TONS)

YEAR	INLAND FISHERIES	SEA FISHERIES	TOTAL
1940	147,000	325,000	472,000
1949	175,000	245,000	420,000

SOURCE: SEA FISHERIES SERVICE, DJAKARTA

TABLE NO. 4

ESTIMATED PRODUCTION OF THE SEA FISHERIES OF INDONESIA BY ISLAND AREAS
1940 AND 1949
(IN METRIC TONS)

ISLAND AREA	1940	1949
JAVA	100,000	60,000
SUMATRA	150,000	90,000
BORNEO	5,000	5,000
CELEBES & NEW GUINEA	70,000	90,000
TOTAL	325,000	245,000

SOURCE: SEA FISHERIES SERVICE, DJAKARTA

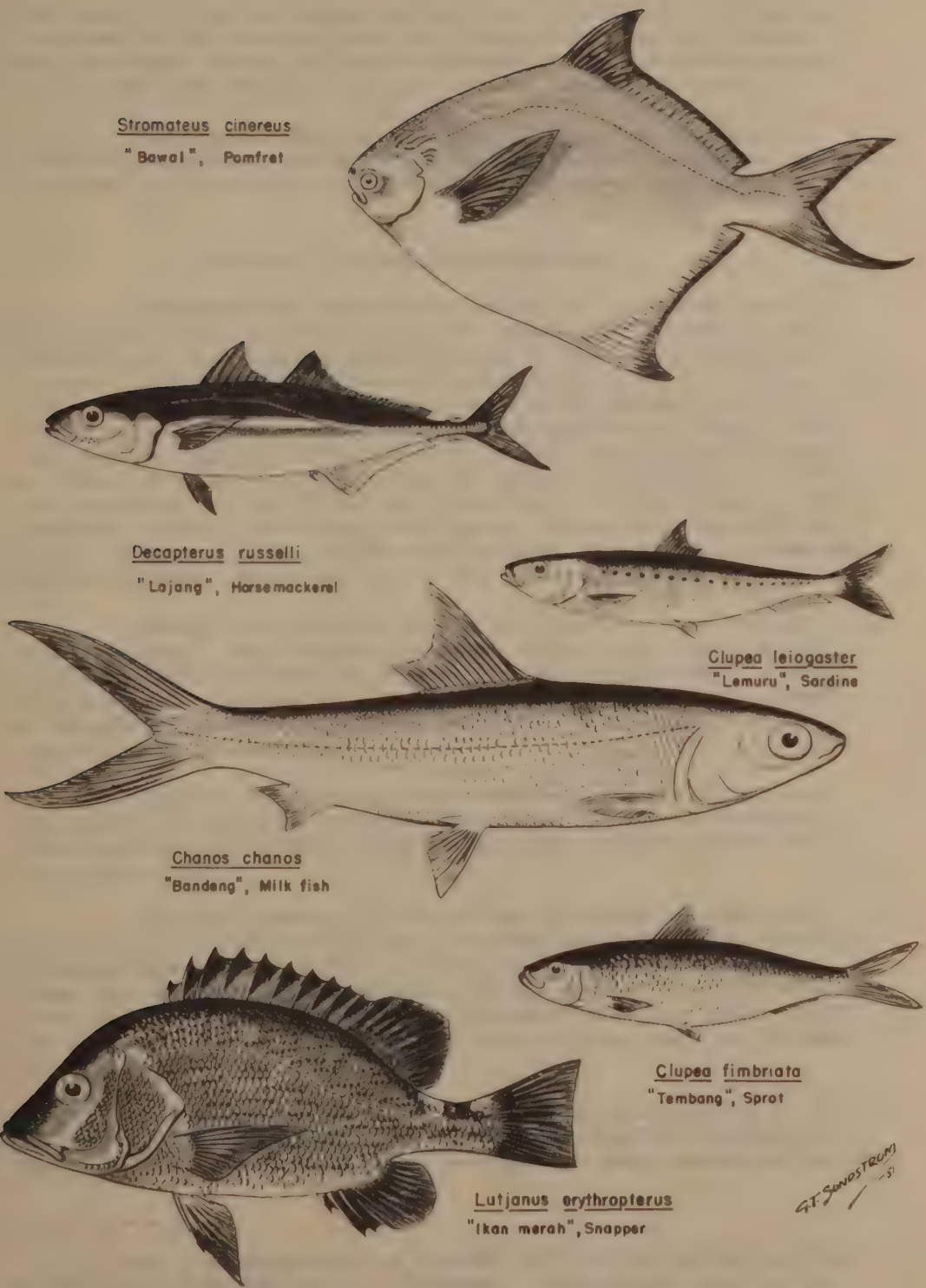
Details are not available on the volume of the catch according to species, but species of considerable importance in several fisheries include those given in the following tabulation. It is unlikely, though, that any one of these species will comprise more than one or two percent of the total catch.

Common Name		Scientific Name	Approximate maximum length in Centimeters
Indonesian	English		
Selar	Horse Mackerel	Caranx sp.	20
Lajang	Horse Mackerel	Decapterus sp.	20
Tjakalang	Dwarf Tuna	Neothunnus rarus	60
Tongkal	Dwarf Bonito	Euthynnus alletteratus	60
Tembang	Sprat	Clupea fimbriata	15
Bawal	Pomfret	Stromateus niger	30
Bawal	Pomfret	Stromateus cinereus	30
Teri	Anchovy	Stolephorus sp.	10
Ikan merah	Snappers	Lutjanus sp.	45
Ekor Kuning	Yellowtail	Caesio erythrogaster	35
Torani	Flying fish	Cypsilurus sp.	20
Lemuru	Sardine	Clupea leiogaster	20
Kembung	Mackerel	Scomber orbicularis	22
Bandeng	Milk fish	Chanos chanos	25-75

The decline in the yield of the sea fisheries in recent years has been due, among other things, to the fact that the fishing fleet of Java has not yet been brought back to its prewar size or capacity, to unrest in certain areas which has restricted fishing activities, to smaller catches from the fishery off the mouth of the Rokan River in the vicinity of Bagansiapiapi, Sumatra, where catches are apparently only 50 percent of prewar, and to the lack of a carrier service to transport salt to this and other vicinities and to bring salted fish back to Java. The amount of the catch from the sea would have been still smaller in 1949, except for the fact that larger catches have resulted from expanding fishing activities around Celebes and New Guinea.

There appear to be opportunities for increasing considerably the catch of fish from the sea. This can be accomplished to a great extent by motorizing more boats or vessels of the present "majang" fishing fleet and by adding a fleet of new motorized vessels. In this way production per vessel can be increased by saving on travel time to and from the fishing grounds and by expanding the fishing area farther to sea or to coastal areas not now accessible to the sailing fleet.

A fleet of carrier vessels also would create a market for fish from outlying areas and thus be an incentive for more intensive fishing in areas where fish are known to be abundant, but not close to consuming centers. Probable fishing areas in this respect appear to be off the east and west coasts of Sumatra, south and west coasts of Borneo, Bali Strait or north and south of the approaches thereto, and in the eastern seas of the archipelago--especially for tuna. Plans to accomplish development or expansion of fisheries in these areas will be related later.


Stromateus cinereus
"Bawal", Pomfret
Decapterus russelli
"Lajang", Horsemackerel
Clupea leiogaster
"Lemuru", Sardine
Chanos chanos
"Bandeng", Milk fish
Clupea fimbriata
"Tembang", Sprot
Lutjanus erythropterus
"Ikan merah", Snapper
G.T. Sjöstrom
-51

The increase of the production of the inland fisheries in 1949 over 1940 is due mainly to exploitation of the latent fishery resources in the rivers, lakes, and swamps of Borneo and Celebes. The Government feels that these resources can be fished more intensively when conditions become more settled on these islands.

There are possibilities also for expanding the inland fisheries of eastern Sumatra. And fish production in tambaks can be increased in Java by improving old ponds and developing new ones.

Fishing Ports and Auction Markets

Commercial or subsistence fishing is carried on from practically every port of any size throughout the islands of the archipelago. The names of many of those of sufficient importance to have a public fish auction are listed in Table No. 5. This table also shows the volume of fish sold on the market, the value of the sales and the average price per kilogram during 1949. This list does not purport to be complete, because many auction markets at other ports did not submit records on their transactions in 1949 to the central office of the Sea Fisheries Service in Djakarta. For instance, records are missing for some of the ports around the important region of Tuban on Java and for many of the ports on Sumatra, Bangka/Billiton, Borneo and in eastern Indonesia as a whole.

Except for Djakarta, no one port receives a very large volume of fish. As a result, the catch can be distributed fairly easily in fresh condition to a large population living over a rather wide area. The landing of fish at a great many ports has produced a distributor trade consisting of many small entrepreneurs rather than a few large concerns.

Another factor which has discouraged the growth of large wholesale fish concerns and which has broken off the tie between fish producers and money lenders is the public auction market for the sale of fish.6/

The Sea Fisheries Institute has sponsored the establishment of these markets to provide a constant and fair market for the fisherman's catch and in turn provide him with facilities and services that heretofore were furnished to him at high costs, as well as at high interest rates if he had to secure them on credit. Where one of these markets exists, primary sales of fish can only be made through them.

The market places may be owned by the municipality of the port where located, although many of them are owned by cooperative associations of fishermen. There is a general trend toward the latter

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6/ For a description of a typical fish auction market see "Fish Marketing in Batavia" by G. L. Kesteven. Proceedings Indo-Pacific Fisheries Council. Singapore. 1949. Some of the information in the following section has been drawn from this report.

TABLE NO. 5

SUPPLY, RECEIPTS AND AVERAGE PRICE PER KILOGRAM OF FISH SOLD ON CERTAIN PRIMARY PUBLIC AUCTION MARKETS IN MADURA, 1949

Location	Supply in Kilograms	Receipts in Rupiah	Average Price Per Kilogram in Sen
Bangkalan	49,992	87,683	175
Arosbaja	191,779	347,699	181
Klampis	1,114,674	1,073,182	96
Sepulu	1,816,758	2,348,091	129
Banjuates	315,250	138,801	44
Ketapang	812,567	980,239	121
Temburu	534,560	564,813	106
Ambunten	342,098	337,539	99
Slopeng	144,764	169,676	117
Padelegan	350,912	303,489	86
Tandjung	224,573	382,016	170
Tjamplong	211,693	301,497	142
P. Kambing	403,705	336,917	83
Kwanjar	364,905	551,637	151
Legung	109,843	74,469	68
Sreseh	73,620	49,482	67
Pasongsongan	271,214	321,088	118
Pasean	456,181	504,494	111
Satjah	8,136	11,230	138
Prenduan	1,847	4,709	255
Brantapasisir	17,902	22,832	128
Sampang	10,753	26,271	244
Tjerek	18,427	20,474	111
Talang	12,294	13,185	107
Tordjun	219	284	130
Modeng	148	340	230

SUPPLY, RECEIPTS AND AVERAGE PRICE PER KILOGRAM OF FISH SOLD ON CERTAIN PRIMARY PUBLIC AUCTION MARKETS IN JAVA, 1949

Tjilatjap	623,284	430,877	69
Plabuanratu	171,551	275,486	160
Labuan	345,074	420,670	122
Batavia	7,835,313	14,238,536	182
Eretan	2,056,359	2,351,237	114
Indramaju	445,989	500,184	112
Gebang Ilir	870,307	715,512	82
Dadap	1,344,031	1,833,551	136
Mundu	438,498	387,027	88
Bondet	341,530	315,343	92
Pakutukan	26,604	33,228	125
Sawedjadjar	1,216,645	1,002,433	82
Tegal	2,220,305	2,226,277	100
Tandjungsari	1,960,809	1,838,658	93
Wonokerto	1,081,159	1,185,265	110
Batang	920,962	884,068	96
Bandengan	803,195	656,631	82
Tawang	887,396	757,242	85
Semarang	1,595,322	1,352,773	85

TABLE NO. 5 (CONT.)

LOCATION	SUPPLY IN KILOGRAMS	RECEIPTS IN RUPIAH	AVERAGE PRICE PER KILOGRAM IN SEN
REMBANG	408,448	370,898	91
MORODEMAK	777,927	700,135	90
JAPARA	336,269	187,570	56
DJUANA	191,796	131,963	69
PASURUAN	492,493	615,366	125
LEKOK	125,428	128,514	102
NGULING	102,720	138,734	135
PROBOLINGGO	134,484	149,055	111
KRAKSAAN	205,165	163,722	80
PAITON	19,749	17,920	91
BESUKI	171,359	107,426	62
PANARUKAN	195,981	187,802	95
SITUBONDO	130,441	106,504	82
ASEMBAGUS	53,150	63,769	120
MUNTJAR	2,802,415	2,093,841	74

SUPPLY, RECEIPTS AND AVERAGE PRICE PER KILOGRAM OF FISH SOLD ON CERTAIN PRIMARY PUBLIC AUCTION MARKETS IN BAWEAN, SUMATRA, BANGKA/BILLITON, BORNEO, O. INDONESIA 1949

BAWEAN			
SANGKAPURA	1,158,085	574,303	50
TAMBAK	1,393,040	696,805	50
SUMATRA			
TELOKBETONG	672,172	1,291,089	192
BANGKA/BILLITON			
PANGKALPINANG	503,174	609,789	121
BORNEO			
PONTIANAK	1,462,297	3,504,606	240
PEMANGKAT	483,435	779,302	161
SINGKAWANG	460,554	962,194	209
O. INDONESIA			
CELEBES			
MAKASSAR	2,389,150	3,774,098	158
PARE-PARE	167,205	240,245	144
MENADO	787,916	1,777,581	225
AERTEMBAGA	1,077,625	1,178,146	109
BAU-BAU	105,602	48,887	46
AMBON	2,001,638	1,702,429	85

The packing of bandeng in ice (East Java).

The marketing of bandeng.

course since most of the markets are proving profitable enterprises and there is a desire on the part of the National Government for the fishermen to have a full share of these profits, rather than a municipality or private companies.

All of the markets are operated on the same principle, although services rendered may vary from one to another, depending upon circumstances. The market receives fish or fish products discharged by fishing craft or brought to it by other means. These are sold at auction, usually in small lots but with a minimum of 10 kilograms, to anyone willing to buy. Bids progress from low to high. Sales are made for cash. Buyers must settle their accounts immediately; whereupon the fishermen are paid the selling price, minus five percent commission. Some auction markets also deduct ten percent from the gross sales, which amount is put in a savings account for the sellers. No interest is paid on deposits in this account. At the end of each calendar year the sums in the accounts are paid to the fishermen. A representative of the Sea Fisheries Institute is present at the sale, and if prices appear too low he may intervene and buy to exercise a control on the market. The Institute is said never to have lost on such transactions.

The market organizations also render other services to the fishermen. They may extend loans to purchase fishing supplies and equipment. Such loans are amortized by deductions from the amounts payable on the sale of each lot of fish handled for the debtor by the market. The organizations also may sell various types of fishing supplies and ship chandlery and issue salt on behalf of the salt monopoly. They may also operate a clinic and give free medical service to the fishermen. Some markets may provide office space for the staff of a cooperative association of fishermen. Some auction markets also finance the building of homes for fishermen. These are sold on long-term payment plans. The cost for these services is financed by the five percent commission charged against the gross sales of the market, as well as any profits made on the sale of supplies and equipment and interest on loans.

These markets have proved their worth in effecting the orderly marketing of the fishery harvest and in turn have improved the financial status of the fishermen. Further more, they have created a close working arrangement between the fishing industry and the government which is striving to improve the welfare of people engaged in this industry.

Retail Marketing

The fresh fish sold at the auction markets generally reach consumers through street peddlers or stalls in public markets. Salted and dried fish are also marketed through these channels, but they are more likely to be found on sale in a retail store.

The Sea Fisheries Service collects data on the prices of various types of fish sold in certain retail markets of ten representative cities. The prices at these markets in 1949 are shown in Table No. 6. As will be noted from this, prices are generally highest in Djakarta. Data are not at hand to compare retail prices directly with wholesale auction prices, but, according to Kesteven there is a retail mark-up of anything from 100 to 300 percent.

It is interesting to note also from Table No. 6 that retail prices at an interior point, such as at Bandoeng, may be lower than at a primary port such as Djakarta. This is due largely to the fact that Bandoeng is supplied by ports having a surplus of fish, such as Eretan, Gebangilier and others in the residency of Tjirebon. Auction prices for fish in these cities are low in comparison with those in Djakarta, where there is a deficiency of fish. Thus, fish can be shipped from these ports to Bandoeng at a profit in spite of additional costs for transportation, ice, and other incidentals.

Fish Processing Industry

The principal fish processing industry in Indonesia is engaged in salting and drying fish. Of second importance is the manufacture of fish paste. There is also an industry engaged in the preservation of fish roe and milt. At one time a sardine cannery was in operation, but because of erratic supplies this was abandoned.

Figures are not available on the volume of the fish used in the processing industry or on the output. However, an idea of the input in 1949 in the salt-fish branch can be deduced from figures in Table No. 7. This shows the amount of salt issued that year to the industry for preserving fish. The Sea Fisheries Service figures that one metric ton of salt is used to preserve four metric tons of raw fish. On this basis, the 28,919 metric tons of salt issued in 1949 would place the input of raw fish at around 115,000 metric tons. Of this, over 80,000 metric tons of raw fish were preserved on Sumatra alone.

Salted fish is subject to government inspection to determine whether it is fit for human consumption.

Salt for the fishing industry is readily available in Indonesia. Large quantities are produced by solar evaporation of sea water on Madura and other islands. The production and distribution of salt is a government monopoly in Java, Sumatra, Borneo, and north Celebes. In the other areas production is free. The Sea Fisheries Service and the Inland Fisheries Service have agreements with the monopoly to have salt available for salting fish at a lower price than consumption salt.

TABLE NO. 6

FREE MARKET PRICE PER KILOGRAM FOR VARIOUS TYPES OF FISH IN CERTAIN RETAIL MARKETS OF INDONESIA, 1949

		FRESH FISH							SALTED FISH						
LOCATION	1949	TERIE	EKOR KUNING	BAWAL	KAKAP (WIT)	KAKAP (ROOD)	BANDING (GROOT)	UNDANG MIDDEL GROOT	TERIE	DJAMBAL	GABUS (GROOT)	TANGIRI	SELAR	PEDA (ROOD)	PEDA (WIT)
DJAKARTA	JANUARY	4,665	5,44	6,43	8,93	6,665	7,10	7,545	3,865	-	4,075	-	3,965	0,215 A)	0,215 A)
	FEBRUARY	4,155	5,27	6,445	8,895	6,50	9,55	7,71	4,215	-	5,24	-	4,085	0,275 A)	0,295 A)
	MARCH	3,635	5,235	6,06	8,695	5,85	8,18	7,205	3,87	-	4,52	-	3,54	0,235 A)	0,23 A)
	APRIL	3,14	4,48	5,91	8,35	5,645	9,105	7,125	3,865	-	5,785	-	3,47	0,235 A)	0,21 A)
	MAY	3,30	4,285	5,925	8,-	5,395	7,46	6,965	4,145	-	6,225	-	4,05	0,27 A)	0,245 A)
	JUNE	3,155	4,54	5,85	8,055	5,30	7,93	7,415	3,975	-	5,785	-	3,675	0,27 A)	0,25 A)
	JULY	3,445	4,455	6,165	8,145	5,45	8,035	7,335	3,645	7,50 B)	5,865	-	3,55	5,09	4,145
	AUGUST	3,045	4,39	5,835	7,22	5,50	6,975	6,35	3,625	5,75	5,215	-	3,875	3,50	2,95
	SEPTEMBER	3,285	4,375	5,50	8,20	5,585	6,485	6,415	4,335	7,75 B)	5,50	-	4,-	4,225	4,165
	OCTOBER	3,65	4,545	5,93	8,335	5,565	7,78	7,065	4,125	7,25	5,75	-	4,055	4,75	4,43
	NOVEMBER	3,07	4,65	5,59	8,125	5,665	7,-	6,225	4,375	6,-	5,635	-	4,135	0,275 A)	0,26 A)
	DECEMBER	3,365	4,325	5,645	8,445	5,945	7,58	6,335	4,305	6,50	6,-	-	4,535	0,285 A)	0,26 A)
BANDOENG	JANUARY	-	-	4,-	4,-	-	4,-	3,50	2,75	5,-	4,-	-	-	-	3,50
	FEBRUARY	-	-	4,-	4,-	-	4,-	3,-	2,75	5,-	3,50	-	3,50	5,-	4,25
	MARCH	2,-	-	4,-	4,-	-	4,-	5,-	2,75	5,-	3,50	-	2,60	3,80	3,40
	APRIL	2,-	-	4,-	4,-	-	4,-	3,-	2,75	5,-	3,50	3,50	3,50	5,-	4,50
	MAY	2,-	-	4,-	4,-	-	4,-	3,-	3,-	6,-	5,-	5,-	4,-	5,-	4,50
	JUNE	3,-	-	4,-	4,-	-	6,-	2,-	3,-	6,-	6,-	5,-	4,-	6,-	5,-
	JULY	2,75	-	4,-	4,-	-	6,-	2,50	3,50	6,-	5,-	5,-	3,50	6,-	5,-
	AUGUST	2,50	-	4,-	4,-	-	6,-	2,50	3,50	5,50	4,50	4,-	3,50	-	0,2 A)
	SEPTEMBER	3,-	-	4,-	4,-	-	6,-	2,75	3,50	5,-	5,-	4,-	3,50	0,25 A)	0,225 A)
	OCTOBER	3,-	4,- F)	3,50	4,-	3,50	3,50	5,-	3,50	6,-	5,-	4,-	4,-	0,20 A)	-
	NOVEMBER	3,50	3,50	4,50	5,-	3,50	4,50	4,50	4,-	6,-	5,50	5,-	4,-	0,275 A)	-
	DECEMBER	3,50	3,50	4,50	4,50	4,50	5,-	4,-	4,-	7,50	6,-	5,50	4,50	0,275 A)	0,275 A)
CHERIBON	JANUARY	1,-	-	1,20	-	-	-	1,50	3,-	-	3,25	-	2,75	2,75	2,75
	FEBRUARY	1,-	-	1,20	-	-	-	2,-	2,50	-	3,50	-	2,50	2,50	2,50
	MARCH	1,-	-	1,20	-	-	-	2,-	2,50	-	3,50	-	2,50	2,50	2,50
	APRIL	-	-	-	2,-	-	-	2,-	2,-	-	2,50	-	2,-	2,-	2,-
	MAY	1,-	-	-	2,50	-	-	2,-	2,50	-	3,50	-	2,-	2,-	2,-
	JUNE	1,-	-	-	2,50	-	-	2,-	2,50	-	3,50	-	2,-	2,-	2,-
	JULY	1,25	-	-	3,-	-	-	2,-	3,-	2,50	4,50	-	2,50	3,50	-
	AUGUST	1,25	-	-	3,-	-	-	2,50	3,-	-	4,50	-	-	3,50	-
	SEPTEMBER	1,25	-	-	3,-	-	-	2,50	2,-	-	-	-	2,50	2,50	-
	OCTOBER	1,25	-	3,-	-	-	-	2,50	2,-	2,50 C)	-	-	-	2,50	-
	NOVEMBER	1,25	-	3,-	-	-	-	2,50	2,-	2,50 C)	-	-	-	2,50	-
	DECEMBER	1,25	-	3,-	-	-	-	2,-	2,-	2,50	-	-	2,50 C)	2,50	-

TABLE NO. 6 (CONT)

FREE MARKET PRICE PER KILOGRAM FOR VARIOUS TYPES OF FISH IN CERTAIN RETAIL MARKETS OF INDONESIA, 1949

		FRESH FISH							SALTED FISH						
LOCATION	1949	TERIE	EKOR KUNING	BAWAL	KAKAP (WIT)	KAKAP (ROOD)	BANDING (GROOT)	UNDANG MIDDEL GROOT	TERIE	DJAMBAL	GABUS (GROOT)	TANGIRI	SELAR	PEDA (ROOD)	PEDA (WIT)
SEMARANG	JANUARY	-	-	-	3,50	3,-	3,-	2,50	-	-	3,50	-	2,-	0,25[A]	0,15[A]
	FEBRUARY	-	-	-	4,50	-	2,50	2,25	2,50	-	4,50	-	-	4,60	2,50
	MARCH	-	-	-	4,-	-	2,50	2,50	2,50	-	4,50	4,-	-	2,-	3,50
	APRIL	-	-	-	3,50	-	2,25	2,75	2,-	-	4,-	-	2,-	1,80	2,50
	MAY	-	-	-	3,50	-	2,50	2,75	1,66	-	4,50	4,-	3,-	2,50	2,-
	JUNE	-	-	3,-	3,50	-	2,50	2,50	1,60	2,50	-	4,-	2,-	2,20	2,10
	JULY	-	-	-	3,50	-	2,75	2,75	1,80	-	4,-	3,-	2,50	-	-
	AUGUST	-	-	-	4,50	-	3,50	3,-	1,50	3,50	4,50	4,-	2,-	-	0,065[A]
	SEPTEMBER	-	-	-	4,-	-	3,50	3,-	2,50	3,-	4,50	3,50	3,-	-	-
	OCTOBER	-	-	-	6,-	-	5,-	4,50	2,50	-	4,75	-	-	-	-
	NOVEMBER	-	-	3,50[F]	5,-	-	4,50	3,50	2,-	-	4,50	4,-	2,50	-[A]	-
	DECEMBER	-	2,50[F]	-	5,-	-	5,50	3,-	2,-	3,50	5,-	4,-	2,50	0,25[A]	-
SALATIGA	JANUARY	0,80	-	-	-	-	2,-	4,-	2,50	-	-	4,-	-	0,22[A]	0,25[A]
	FEBRUARY	0,90	-	-	-	-	2,-	4,-	2,50	-	-	4,-	-	0,22[A]	0,22[A]
	MARCH	0,90	-	-	-	-	2,-	4,-	2,50	-	-	4,-	-	3,335	3,79
	APRIL	x)	x)	x)	x)	x)	x)	x)	x)	x)	x)	x)	x)	x)	x)
	MAY	0,90	-	-	-	-	2,-	4,-	2,50	-	-	4,-	-	3,335	3,79
	JUNE	0,90	-	-	0,15[A]	-	2,-	4,-	2,50	-	-	4,-	-	0,22[A]	0,25[A]
	JULY	1,-	-	-	-	-	2,50	4,-	2,50	-	-	5,-	-	0,22[A]	0,22[A]
	AUGUST	1,20	-	-	-	-	3,-	4,-	3,-	-	-	6,-	-	0,25[A]	0,27[A]
	SEPTEMBER	1,25	-	-	-	-	3,50	3,-	3,50	-	-	7,50	3,50[E]	0,25[A]	0,27[A]
	OCTOBER	2,-	-	-	-	-	3,50	4,-	4,-	-	-	7,50	-	0,25[A]	0,27[A]
	NOVEMBER	2,-	-	-	-	-	3,50	4,-	4,-	-	-	7,50	-	0,25[A]	0,27[A]
	DECEMBER	2,-	-	-	-	-	3,50	4,-	4,-	-	-	7,50	3,50[E]	0,25[A]	0,27[A]
SURABAJA	JANUARY	1,50	2,125	-	2,50	2,25	2,46	1,875	2,75	-	3,25	-	-	0,22[A]	0,26[A]
	FEBRUARY	-	2,25	-	2,875	2,50	2,50	2,125	3,-	3,50	3,375	3,-	-	1,75	-
	MARCH	-	2,50	2,75	2,625	2,75	2,50	2,625	4,25	3,-	3,375	3,-	-	3,50	3,50
	APRIL	-	2,50	2,50	3,-	2,50	2,675	3,50	4,125	-	-	-	-	-	3,50
	MAY	-	-	2,50	3,-	2,875	2,675	3,25	3,375	3,50	3,50	-	-	3,-	3,50
	JUNE	-	2,25	-	3,125	2,75	3,-	3,25	4,-	-	-	-	-	3,125	3,50
	JULY	-	-	-	-	-	3,925	3,625	3,50	3,25	4,75	-	3,375	3,-	3,25
	AUGUST	-	3,-	4,-	4,25	-	4,75	4,375	3,625	3,75	4,66	-	2,75	-	3,50
	SEPTEMBER	-	3,-	4,50	4,50	4,-	4,50	4,-	3,75	-	4,125	4,25	3,-	-	3,-
	OCTOBER	-	3,50	4,50	4,50	4,-	3,75	4,625	3,50	-	4,625	4,50	3,50	-	3,25
	NOVEMBER	-	3,50	4,-	3,-	3,50	3,66	5,-	3,625	-	4,25	4,50	-	-	2,85
	DECEMBER	-	-	4,-	3,-	3,25	3,375	4,-	4,50	-	4,875	-	-	-	3,25

TABLE NO. 6 (CONT)

FREE MARKET PRICE PER KILOGRAM FOR VARIOUS TYPES OF FISH IN CERTAIN RETAIL MARKETS OF INDONESIA, 1949

		FRESH FISH							SALTED FISH						
LOCATION	1949	TERIE	EKOR KUNING	BAWAL	KAKAP (WIT)	KAKAP (ROOD)	BANDING (GROOT)	UDANG MIDDEL GROOT	TERIE	DJAMBAL	GABUS (GROOT)	TANGIRI	SELAR	PEDA (ROOD)	PEDA (WIT)
MEDAN	JANUARY	-	4,-	3,50	4,50	4,50	-	3,50	2,50	3,50	5,-	5,-	2,50	3,-	2,50
	FEBRUARY	-	4,20 [B]	3,50	4,50	4,50	-	3,-	2,25	3,50	4,-	5,- [B]	2,15	3,-	2,50
	MARCH	-	4,50 [B]	3,75	4,50	4,50	-	3,25	2,25	3,50	3,75	5,- [C]	2,-	2,50	2,50
	APRIL	-	4,50 [B]	4,-	4,-	4,-	-	2,75	2,-	3,50	3,75	4,50 [B]	2,-	2,25	2,25
	MAY	-	4,20 [B]	4,-	4,-	4,-	-	2,50	2,30	-	3,75	5,- [B]	2,40	2,50	2,25
	JUNE	-	5,- [B]	4,50	5,-	4,50	-	4,-	2,50	-	4,50	5,50 [B]	2,50	3,-	2,60
	JULY	-	-	4,25	4,50	5,-	-	4,-	2,50	-	-	-	2,-	2,70	2,40
	AUGUST	-	5,50 [B]	4,20	4,50	3,50	-	3,50	2,50	-	5,50 [B]	-	2,-	3,-	2,20
	SEPTEMBER	-	5,50 [B]	4,50	4,-	3,50	-	3,-	2,50	-	5,50 [B]	-	1,90	3,-	2,20
	OCTOBER	-	5,50 [B]	4,- [H]	3,75	3,50	-	2,50	2,50	5,-	5,- [B]	-	1,90	3,-	2,20
	NOVEMBER	11,50 [B]	-	-	4,25	3,50	-	2,75	2,50	-	5,50 [B]	-	2,-	3,-	2,20
	DECEMBER	-	5,50 [B]	-	4,25	3,50	-	2,50	3,-	-	3,-	5,-	2,-	3,-	2,20
PALEMBANG	JANUARY	3,50	4,-	6,-	6,50	6,-	-	4,-	-	4,-	3,-	-	-	-	3,50
	FEBRUARY	-	6,50	7,-	7,-	6,50	5,-	4,-	3,25	3,50	3,-	4,50	5,-	4,25	4,-
	MARCH	-	7,-	7,50	7,-	6,50	6,-	4,-	-	4,-	3,25	-	-	3,25	3,-
	APRIL	-	7,-	7,50	7,-	6,50	6,-	4,-	3,25 [J]	4,-	3,-	5,- [C]	5,- [K]	3,50	3,25
	MAY	-	6,-	7,-	6,50	5,50	5,50	3,-	-	4,-	2,75	4,50	5,-	3,50	3,25
	JUNE	-	5,-	6,-	6,-	5,-	4,50	3,-	2,75 [J]	3,50	2,50	4,50 [C]	-	-	-
	JULY	-	5,-	6,-	6,-	5,-	4,50	3,-	-	3,50	2,50	4,50	-	-	-
	AUGUST	-	5,-	6,-	5,-	4,50	4,-	3,-	-	3,50	2,-	4,-	-	-	-
	SEPTEMBER	-	5,-	6,-	5,-	4,50	4,-	3,-	-	3,75	3,375	4,50	-	-	-
	OCTOBER	-	5,-	6,50	6,-	6,50	5,-	4,50	3,- [J]	4,50	3,-	5,-	5,50 [E]	-	-
	NOVEMBER	-	5,-	6,50	6,-	6,50	5,-	4,50	-	4,50	3,-	5,-	-	-	4,-
	DECEMBER	-	5,-	6,50	6,-	6,50	5,-	4,50	-	4,50	3,-	5,-	-	-	4,-
MAKASSAR	JANUARY	2,50	-	-	3,-	-	3,50	-	5,-	4,-	-	-	-	-	-
	FEBRUARY	3,-	-	-	3,-	3,-	3,50	-	5,-	4,50	-	-	-	-	-
	MARCH	2,50	-	-	3,-	-	3,50	2,-	3,-	-	-	2,50	-	-	-
	APRIL	2,-	-	-	2,50	2,-	2,50	1,50	2,-	3,50	2,-	-	1,75	-	-
	MAY	-	2,-	-	2,60	2,50	3,50	2,-	2,-	1,50	1,25	1,50	-	-	-
	JUNE	2,50	-	-	3,-	3,50	3,50	2,-	2,75	-	1,70	1,60	1,50	-	-
	JULY	2,50	1,50	2,-	3,-	2,50	3,50	2,50	1,90	-	-	1,60	-	-	-
	AUGUST	2,-	-	-	2,50	-	3,-	2,-	2,50	-	1,80	1,65	-	-	-
	SEPTEMBER	3,50	2,10	1,75	3,50	3,-	4,-	3,-	3,-	1,85	2,-	1,90	2,-	-	-
	OCTOBER	2,-	1,75	1,65	3,50	3,25	4,-	2,80	2,70	1,80	3,-	2,50	4,50 [E]	-	-
	NOVEMBER	2,10	1,65	2,-	3,50	3,-	4,-	3,-	2,70	-	3,70 [E]	2,60	4,50 [E]	3,335	-
	DECEMBER	2,-	1,70	2,-	4,50	4,25	5,-	4,50	2,75	1,25	-	2,50	-	5,-	5,-

TABLE NO. 6 (CONT)

FREE MARKET PRICE PER KILOGRAM FOR VARIOUS TYPES OF FISH IN CERTAIN RETAIL MARKETS OF INDONESIA, 1949

LOCATION	1949	FRESH FISH							SALTED FISH						
		TERIE	EKOR KUNING	BAWAL	KAKAP (WIT)	KAKAP (ROOD)	BANDING (GROOT)	UNDANG MIDDEL GROOT	TERIE	DJAMBAL	GABUS (GROOT)	TANGIRI	SELAR	PEDA (ROOD)	PEDA (WIT)
MANADO	JANUARY	2,25	3,50	-	-	-	-	-	2,50	-	-	4,-	-	-	-
	FEBRUARY	2,75	5,50	-	-	-	-	-	2,50	-	-	6,-	-	-	-
	MARCH	3,25	6,-	-	-	-	-	-	3,25	-	-	4,-	-	-	-
	APRIL	3,-	5,50	-	-	-	-	-	2,25	-	-	5,50	-	-	-
	MAY	3,-	6,-	-	-	-	-	-	3,-	-	-	5,-	-	-	-
	JUNE	2,-	4,50	-	-	-	-	-	2,25	-	-	4,-	-	-	-
	JULY	2,75	5,-	-	-	-	-	-	2,75	-	-	3,50	-	-	-
	AUGUST	3,-	5,75	-	-	-	-	-	-	2,50 L)	-	4,25	-	-	-
	SEPTEMBER	2,50	4,-	-	-	-	-	-	2,50	-	-	3,25	-	-	-
	OCTOBER	2,75	4,50	-	-	-	-	-	3,-	-	-	2,75	-	-	-
	NOVEMBER	2,75	4,25	-	-	-	-	-	3,-	-	-	3,50	-	-	-
	DECEMBER	2,75	5,50	-	-	-	-	-	3,-	-	-	3,50	-	-	-

0 NATIVE QUALITY
X NO DATA
A PRICE PER PIECE
E JEMBONG
F TONGKOE
I SEPAT
B SENANGIN
C BAWAL
G SUNU
H HITAM
J SUNSANG
K KAKAP
L ROA

TABLE NO. 7

SALT ISSUED BY THE GOVERNMENT OF INDONESIA FOR PRESERVING FISH
1949

	TOTAL KILOGRAMS		TOTAL KILOGRAMS	
JAVA				
TANDJUNGPRIOK	450,477	PASAR-IKAN	169,597	
PONTANG	2,100	KETAPANG	26,628	
TJIREBON	23,060	ERETAN	102,500	
PAOMAN	39,350	DADAP	122,900	
GEBANG ILIR	22,420	LOSARANG	1,000	
INDRAMAJU	-	PELABUANRATU	702	
KARANGASEM	110,965	TEGAL	20,700	
TJILATJAP	53,705	SEMARANG	92,422	
WELIRI	40,958	KENDAL	82,000	
WIRODESA	95,598	PEMALANG	57,400	
GERSIK	66,995	LEKOK	213	
BESUKI	10,500	MUNTJAR	1,020,050	
PANARUKAN	152,036	BANJUWANGI	648,570	
PEKALONGAN	-	BANGSAL	72,146	
SANGKAPURA	266,202	TAMBAK	225,400	
PATJIRAN/WERU	205,724	TUBAN	3,954	
BLIMBING	310,030			4,497,502
MADURA				
AROEBAJA	37,537	AMBUNTEN	27,300	
ARDJASA	41,100	BANJUSANGKA	19,634	
KLAMPIS	269,800	LEGUNG TIMUR	15,350	
KETAPANG	28,880	PASEAN	34,050	
PASONGSONGAN	34,350	SAPEKAN	354,570	
SEPULUH	739,316	TEMBURUH	19,324	
MUKTISARI	-	KETUPAT	2,500	1,623,911
SUMATRA				
BELAWAN	3,793,450	BANGANSIAPAI-API	11,427,123	
BENGKALIS	15,050	SELATPANDJANG	10,950	
MUARA SABAK	10,000	DJAMBI	2,000	
LABUAN BILIK	685,450	TANDJUNGPURA	282,500	
TANDJUNGTIRAN	1,288,400	TELUK NIBUNG	1,204,800	
PALEMBANG	773,850	SINABEI	636,400	
PESIGIRADJA	25,168			20,125,141
BANGKA/BILLITON				
PANGKALPINANG	24,504	TANDJUNGPANDAN	153,530	178,034
WEST BORNEO				
PONTIANAK	627,450	KETAPANG	1,900	
PEMANGKAT	170,480	TANDJUNGSATAI	394,350	
SUDAKANA	81,300			
SOUTH BORNEO				
KOTA BARU	539,200	PANG. BUN	59,839	
PEGATAN	152,310			
ZUID BORNEO				
SAMPIT	247,686	TABANIO	47,075	
EAST BORNEO				
BALIKPAPAN	11,684	TANAH GROGOT	78,314	
TARAKAN	70,193	TANDJUNG REDEB	9,750	2,491,731

TABLE NO. 7 (CONT)

	TOTAL KILOGRAMS		TOTAL KILOGRAMS	
EAST-INDONESIA 1/				
LOEWOEK	170	MANADO (POSSO)	2,491	
TASSO	300	RATAHAN	-	
MAKASSAR	-			2,961
		GRAND TOTAL		28,919,280

1/ EAST INDONESIA IS OUTSIDE THE SALT MONOPOLY AREA AND MOST OF ITS REQUIREMENTS IS SUPPLIED BY ITS OWN SALT PRODUCTION.

SOURCE: GOVERNMENT SALT MONOPOLY, DJAKARTA

Inter-island Trade in Fishery Products

There is a considerable inter-island trade in fish in Indonesia. During 1949 this amounted to 46,196 metric tons valued at 56,324,814 rupiahs. (See Table No. 8.) This represented an exchange of fish both ways between each island area, except that Java and Madura were only importers and they took 44,760 metric tons of the exports. Of this amount, 21,024 metric tons came from Sumatra and the Bangka/Billiton area, 15,843 metric tons from Borneo, and 7,893 metric tons from East Indonesia. The principal items in this trade were loosely packed salted and dried fish and fish paste. The inter-island trade in fish can be greatly increased, especially to supply Java, through the development of a system for collecting and transporting fish from out-of-the-way places to centers that now have a deficiency of fish.

Foreign Trade in Fishery Products

The foreign trade of Indonesia in fishery products has dwindled to small proportions since war's end, compared with the immediate prewar years, as will be noted from Tables Nos. 9 and 10. For instance, a prewar year's imports of salted and dried fish of Asiatic sorts amounted to more than 62,000 metric tons (1939), compared with an import of only 2,941 metric tons of this product in 1949. Imports of canned salmon and sardines too have dropped from 13,067 metric tons in 1937 to only 189 metric tons in 1948, and agar agar from a high of 287 metric tons in 1936 to only one ton in 1948. Reduced imports of these products may have resulted from the desire to conserve foreign exchange. Short supply in exporting countries also may have been a contributing factor.

TABLE NO. 8

TRADE IN FISH BETWEEN THE VARIOUS ISLANDS OF INDONESIA, 1949
(IN METRIC TONS)

TO	CODE NUMBER B/	SUMATRA, BANGKA/BILLITON	FROM A/ BORNEO	FROM A/ EAST INDONESIA	TOTAL
JAVA/MADURA	90	7	-	-	7
	100	14,567	15,618	7,703	37,888
	110	38	4	11	53
	120	4	-	-	4
	130	6,408	221	179	6,808
TOTAL		21,024	15,843	7,893	44,760
SUMATRA, BANGKA/BILLITON	100	-	260	257	517
	110	-	-	1	1
TOTAL			260	258	518
BORNEO	100	127	-	85	212
	110	-	-	10	10
	130	143	-	10	153
TOTAL		270		105	375
EAST INDONESIA	100	19	15	-	34
	130	12	497	-	509
TOTAL		31	512		543
TOTAL EXPORT	90	7	-	-	7
	100	14,713	15,893	8,045	38,651
	110	38	4	22	64
	120	4	-	-	4
	130	6,563	718	189	7,470
TOTAL TRADE		21,325	16,615	8,256	46,196

A/ THERE ARE NO EXPORTS OF FISH FROM JAVA AND MADURA TO THE OTHER ISLANDS OF INDONESIA.
B/ CODE NUMBERS MEAN AS FOLLOWS: 90, FRESH FISH; 100, SALTED AND DRIED FISH, LOOSELY PACKED; 110, CANNED, SALTED, AND DRIED FISH IN PACKAGES; 120, FISH ROE AND MILT; 130, FISH PASTE.

SOURCE: SEA FISHERIES INSTITUTE.

TABLE NO. 9

EXPORTS OF CERTAIN FISHERY PRODUCTS FROM INDONESIA FOR VARIOUS YEARS FROM 1936 TO 1949
(IN METRIC TONS)

YEAR	FRESH FISH A/	FISH, DRIED OR SALTED, LOOSELY PACKED B/	SHRIMP PASTE B/	OTHER FISH	SHELLS C/	ALL TYPES OF FISH D/
1936	2,093	1,580	444	91	2,574	
1937	2,048	1,581	485	82	1,781	
1938	2,100	1,539	331	71	1,445	
1939	2,303	1,453	341	84	1,820	
1940	2,251	1,502	496	81	1,230	
1941	2,050	1,130	641	81	1,354	
1946					312	42
1947					1,359	53
1948					3,020	37
1949					3,657	184

A/ PRODUCED MAINLY AT BAGANSIAPIAPI, SUMATRA AND BORNEO AND EXPORTED MAINLY TO SINGAPORE.
B/ PRODUCED MAINLY AT BAGANSIAPIAPI, SUMATRA.
C/ PRODUCED MAINLY IN THE FAR EASTERN WATERS OF THE ARCHIPELAGO.
D/ SUBSEQUENT TO THE WAR ALL TYPES OF FISH WERE GROUPED UNDER ONE CLASSIFICATION IN THE EXPORT STATISTICS.

SOURCE: MINISTRY OF ECONOMIC AFFAIRS, INDONESIA.

On the export side, the only bright spot is the trade in pearl and trochus shells, the amounts of which in each of the years 1948 and 1949 were around 3,000 metric tons. This exceeded, considerably, the amount exported in any of the immediate prewar years. The recent large exports may have resulted from the fact that the pearl and trochus fisheries are more productive now, after lying more or less idle during the war years.

The exports of fresh, salted, dried and other fish dropped to less than 200 metric tons in 1949 compared with annual exports of around 4,000 metric tons of these products in the immediate prewar years. Formerly, these exports originated around Bagansiapiapi on the east coast of Sumatra and at points on the west coast of Borneo. They were shipped by carrier boats mainly to Singapore. This service has been discontinued and no doubt explains why the amount of these exports has dropped so considerably, especially since Singapore is apparently a good market for fish and fish are available for capture in the former areas.

Fish Consumption

Data are not available on the per capita consumption of fish for all of Indonesia. However, according to the Sea Fisheries Service, per capita availability of fish in Java was estimated at 3.6 kilograms in 1949, compared with 6.7 kilograms in 1940 on a landed weight basis as shown in Table No. 11. This does not include the weight of fish consumed by commercial fishermen out of their catch or that consumed by subsistence fishermen. This would add up to a considerable amount, especially when it is realized that hundreds of thousands of persons fish in the coastal waters, lakes, streams, swamps, and ponds only to supply family needs. However, since there are tens of millions of other people on Java who depend entirely upon the commercial fisheries and imports for their fish supplies, it is apparent from the figure of availability (consumption) in 1949 that the people of this Island are in need of more fish in their diet. Certainly, if fish is the principal animal protein food of the people, then the per capita intake seems very low. In fact, it is one of the lowest of any maritime country.

Fish Requirements

There are various estimates by fishery authorities in Java as to the per capita requirements for fish in the diet of the people of Indonesia. All seem to agree that much more is required than that estimated as the intake, namely 6.7 kilograms, in 1940, which might be called a "normal" year.

One authority is of the opinion that 20 kilograms of fish, on a landed weight basis, are needed annually by the Indonesians, if they are to have a sufficiency. On the other hand, nutrition studies

TABLE NO. 10

IMPORTS OF CERTAIN FISHERY PRODUCTS INTO INDONESIA FOR VARIOUS YEARS FROM 1936 TO 1949 A/
(IN METRIC TONS)

YEAR	FISH, SALTED AND DRIED, ASIATIC SORTS LOOSELY PACKED B/	SARDINES AND SALMON CANNED C/	SHRIMP PASTE B/ (TRASSI)	AGAR AGAR D/
1936	55,200	9,140	125	287
1937	56,611	13,067	324	234
1938	61,577	9,192	209	120
1939	62,718	8,166	113	125
1940	60,187	7,524	167	106
1941	43,644	5,632	37	32
1947	7,922	1,441	1,150 G/	1
1948	2,135	189	361	1
1949	2,941	F/	46	E/

A/ EXCLUSIVE OF MILITARY IMPORTS.
B/ MAINLY FROM SIAM AND INDO-CHINA.
C/ MAINLY FROM EUROPE AND AMERICA.
D/ MAINLY FROM JAPAN.
E/ DATA ARE NOT AVAILABLE.
F/ FOLLOWING WORLD WAR II MOST OF THE CANNED FISH IMPORTS INTO INDONESIA WERE CONSUMED BY THE ARMY FORCES AND ARE NOT INCLUDED IN THE AMOUNTS SHOWN IN THE ABOVE TABLE. SUCH IMPORTS WERE AND ARE UNDER IMPORT LICENSE. AS THE ARMY NEEDS DECLINED AND SINCE THE IMPORTS OF SALTED AND DRIED FISH ARE ON THE FREE LIST, THERE HAS BEEN A SHIFT TO THE LATTER. ACTUAL FIGURES ARE NOT AT HAND ON THE IMPORTS OF CANNED FISH IN 1949, BUT THE IMPORTS OF DRIED AND SALTED FISH, OTHER THAN ASIATIC SORTS, AMOUNTED TO 2,503 METRIC TONS IN 1949.
G/ THIS MAY BE A STATISTICAL ERROR.

SOURCE: MINISTRY OF ECONOMIC AFFAIRS, INDONESIA

TABLE NO. 11

ESTIMATED FISH PRODUCTION, IMPORTS AND AVAILABILITY (CONSUMPTION) IN JAVA, 1940 AND 1949
(IN METRIC TONS)

	1940	1949
COMMERCIAL FISH PRODUCTION (LANDED WEIGHT)		
INLAND FISHERIES	30,000	27,000
SEA FISHERIES	100,000	60,000
FISH IMPORTS 1/		
FROM ABROAD		
CANNED	5,000	2,200
SALTED AND DRIED	100,000	3,200
FROM OTHER ISLES OF INDONESIA		
SALTED AND DRIED	90,000	89,500
FISH EXPORTS	-	-
NET AVAILABILITY	325,000	181,900
POPULATION (ESTIMATED)	48,000,000	50,000,000
PER CAPITA AVAILABILITY 2/ (CONSUMPTION)	6.7 KGS.	3.6 KGS.

1/ CONVERTED TO BASIS OF LANDED WEIGHT BY MULTIPLYING WEIGHT OF CANNED FISH IMPORTS BY 1.5 AND CURED FISH IMPORTS BY 2.
2/ THIS DOES NOT INCLUDE THE AMOUNT OF FISH CONSUMED BY FISHERMEN AND NOT REPORTED IN THE COMMERCIAL STATISTICS OR FISH CONSUMED BY SUBSISTENCE FISHERMEN. THERE ARE NO DATA ON THE VOLUME OF THIS CONSUMPTION.

SOURCE: ESTIMATES OF THE SEA FISHERIES SERVICE, DJAKARTA.

made in this part of the world have indicated that subsistence fishermen usually catch only enough fish to satisfy a family requirement of about 13 kilograms per capita per year. This is roughly twice the intake of the Javanese in 1940 and nearly four times the estimated consumption in 1949.

If the annual per capita requirement were figured at something between the foregoing estimates of 13 and 20 kilograms, say around 15 kilograms, which is comparable to per capita consumption in many European countries, then the fifty million people of Java would need 750,000 metric tons of fish annually. We only need to be concerned with Java, because it seems that the people on the other Islands of the archipelago have a sufficiency of fish. An exception might be with workers on large estates located far inland on these islands. There, people probably do not get adequate supplies of fish because of poor transportation facilities. The remainder of Indonesia, with a population of about twenty-two million people, would need 330,000 metric tons. These amounts would total 1,080,000 metric tons annually.

There is some question as to whether the sea and inland fisheries of Indonesia can produce as much as a million tons of fish annually. Fishery authorities in Indonesia, however, believe that there are very good possibilities that they might produce 750,000 metric tons annually. This seems especially likely if fishing were conducted as intensively off southern Borneo as off northern Java, and if fishing were intensified off both coasts of Sumatra and in the swamps of this island, in the seas of eastern Indonesia and in some of the swamps and lakes of Borneo and the Celebes.

A domestic catch of 750,000 metric tons would provide about 10 kilograms of fish per person, or roughly 50 percent more on Java than in 1940, when per capita was estimated 6.7 kilograms.

In order, physically, to produce 750,000 metric tons of fish in Indonesian waters, which amount is nearly twice the present harvest, productive facilities would have to be very greatly enlarged. In view of present circumstances, it is unlikely that funds are, or will be, forthcoming to finance such an expansion, at least for a considerable number of years. For the immediate future then it seems that the best hope is to make available to Java at least as much fish as in 1940; namely 325,000 metric tons. Even if this were done, per capita availability of fish would still be less than in 1940, because of the increase in population since then, and less than one-half of the estimated needs.

II. FISHERY ADMINISTRATION

Historical Background

Up to a few years after the turn of the present century, little was done by the Government of Indonesia to promote or encourage a fishing industry in the Islands. In fact, Government policy in this respect actually discouraged fishing on any large scale. As a result, fishing craft remained small and were propelled by oar or sail. Fishing methods too remained more or less primitive. This policy prevailed in spite of the fact that fish was the principal animal protein food of the ever-growing population. It was due in part, no doubt, to the fact that fish was not an export crop, and with a favorable and expanding world market for tin, rubber, pepper, copra and other valuable products it was easy to obtain foreign exchange to buy fish from abroad to meet local requirements not supplied by the domestic fishing industry.

By 1904, however, the Government came to realize that Indonesia had fishery resources that could form the basis of an important industry as well as produce a valuable food product, and in that year it initiated a limited fishery research program. This was directed toward studying the biology of the fishes found in the waters surrounding the archipelago, at locating new fishing grounds in the area, and at improving fishing methods.

The latter researches, however, did not include studies to motorize the fishing fleet, in keeping with world-wide developments in this direction. Apparently, this was due in part to the fact that transportation interests in the Netherlands East Indies seemed to fear that a motorized fishing fleet might become a competitor in the inter-island freight and passenger trade. Furthermore, the qualification requirements for engineers and deckhands in the Indonesian Merchant Marine may have been set so high that few fishermen could qualify to operate motorized craft.

During the years following 1904, many fishermen and others made repeated efforts to obtain permission from the Government to install motors in their craft; but it was not until as late as 1934 that their efforts proved successful. In that year the Government authorized its commercial fishery agency, the Sea Fisheries Institute, to build and experiment with several small motor-propelled fishing vessels. These, of course, operated successfully and were then sold to eager buyers in the commercial fisheries. In addition, some private European interests in Indonesia built several such vessels, which also proved successful.

Progress was slow, however, in motorizing the fishing fleet during the following years because the building of large motorized vessels

for off-shore fishing or in waters along the coast far distant from the home port of the vessels was still not permitted. This meant that the motor vessels adhering to these restrictions were limited to operating in nearby waters, already being rather intensively fished by sailing craft. Thus, by the time the war began in Europe in 1939, there were only thirty two motor fishing vessels in all of Indonesia.

With the outbreak of the war, the situation changed rapidly. There was fear then that sources of fish from Europe and elsewhere might dry up, and therefore something should be done to stimulate the local fisheries. Consequently, the Government took steps to motorize the fishing fleet on a large scale. By then it was too late, for before this program could be implemented to any extent Japanese troops had occupied Indonesia.

During the occupation the Japanese did little or nothing to encourage the Indonesians to catch more fish. They did, however, explore the seas around the Islands more intensively for tuna and were successful in developing a fishery for this species. It might have attained some size except for the fact that American submarines and other naval craft made fishing operations untenable. However, the knowledge gained by the Japanese in these explorations is now being put to use by the Indonesians in developing a tuna fishery.

During the war the fishing fleet of Indonesia suffered great damage. Many vessels, including all the motorized craft, were sunk; and due to the shortage of materials many of the remainder fell into a bad state of repair. Fishing gear also deteriorated. At the end of the war, it was estimated that the productive capacity of the fishing fleet, on Java alone, had been reduced by 20 percent and fishing gear by 40 percent of prewar.

Following the surrender of Japan the Government took immediate steps to revive the fishing industry. One of the first of these was to form the Sea Fisheries Service. Under the auspices of this Service, some Japanese fishing vessels were raised and other local craft repaired. But in general not much could be done throughout the entire area toward rebuilding the fleet because of unrest in the western sector. Because of this, it was necessary to close the headquarters of the Service in Djakarta, and subsequently they were moved to Makassar on the southwest peninsula of Celebes, where the situation was more secure.

Work from this station was directed mainly toward developing a tuna fishery which seemed promising in view of the Japanese activities in this field in this area before and during the war. To further this work, stations were subsequently established at Aertembaga in the northeast peninsula of Celebes, on Ambon Island, and at Sorong on the northwest tip of New Guinea. These stations also serviced the fishing industry in the nearby areas, as well as distributing fishing supplies imported by the Sea Fisheries Institute.

Later, when unrest in the western sector subsided, the headquarters of the Service was moved from Makassar back to Djakarta, and the fishing programs were directed from there.

The Government is now most sympathetic toward improving and expanding the fishery industry; not only to produce a much needed food product, but also to serve as a training ground for sailors and marine engineers.

The Fishery Services

The Government administration of the fisheries of Indonesia at present is effected through the Sea Fisheries Service and the Inland Fisheries Service, both of which are in the Ministry of Agriculture and Fisheries, formed on September 7, 1950. Prior to that time this Ministry was a branch of the Ministry of Economic Affairs. The Ministry of Agriculture, which is currently undergoing changes in organization, is composed of the following offices: Sea Fisheries Service, Agriculture Service, Forestry Service, Veterinary Service, Estate Agriculture Service, Administration of Government Estates, and the Botanical Gardens. The Inland Fisheries Service is under the direction of the Agriculture Extension Office of the Agriculture Service, but it may be coordinated with the Sea Fisheries Service. Two laboratories are concerned with fishery research. One of these, the Laboratory for the Investigation of the Sea, is administered through the Botanical Gardens. The other, the Laboratory for Inland Fishery Research, is directed through the General Experiment Station for Agriculture of the Agriculture Service.

Sea Fisheries Service

The Sea Fisheries Service was established after the surrender of Japan. Its prime duties are to increase fish production and raise the living standards of those engaged in the fishing industry. It is composed of a Technical and Scientific Section and a Social and Economic Section. The operational arm of the Service is the Sea Fisheries Institute. The personnel of the Service and the Institute are experienced and of high caliber.

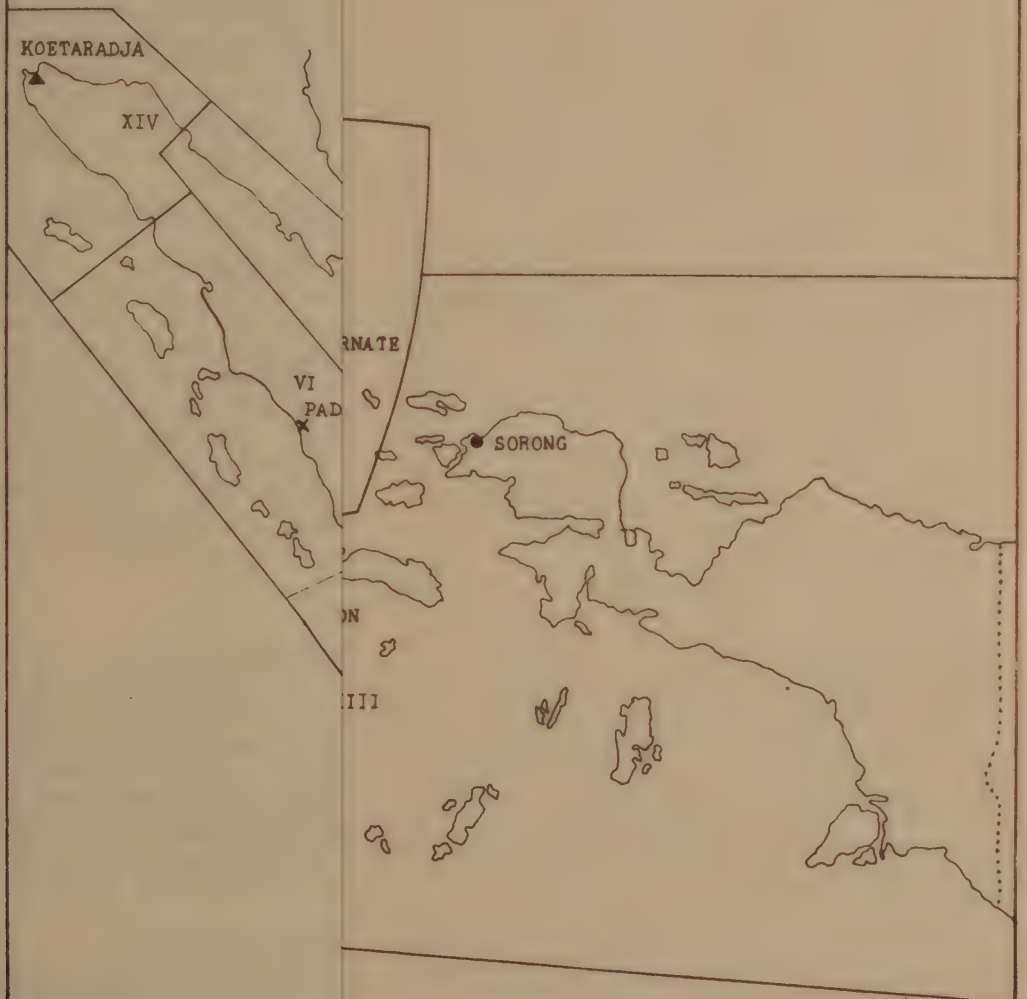
The central administrative office of the Service is located in Djakarta. A branch office of the Service is also located in Djakarta. The latter handles affairs concerned with the fisheries of Sumatra and its adjacent islands and Borneo. (Zone No. 2.) A second branch office will likely be opened at Semarang. This will deal with the sea fisheries of Java and Mandura (Zone No. 1). A third branch office is located at Makassar which deals with the sea fisheries of eastern Indonesia, including Celebes, New Guinea and the Sunda Island group (Zone No. 3). The demarkation of the various zones and the districts within the zones is shown in Map No. 2. Details regarding the vessels operated by the Service are given in the following tabulation:

LIST OF VESSELS OPERATED BY THE SEA FISHERIES SERVICE

Name and Type		Use and Station
"SIBULA"		
Type	-trawler	Used for Oceanographic Research
Net tonnage	-18.97 R.T.	
Motor type	-Gray marine - 165 HP-full Diesel	
Age	-5 years old	Station: - Makassar
"SEMBILAN"		
Type	-trawler	Used for exploratory commercial
Net tonnage	-22.35 R.T.	research combined with biological
Motor type	-Hercules-225 HP-full Diesel	explorations
Age	-5 years old	Station:-Ambon
"Sunu"		
Type	-trawler	Used for trawl-explorations and
Net tonnage	-11.72 R.T.	technical fishery research
Motor type	-Hercules-225 HP full Diesel	Station: -Aertembaga (formerly)
Age	-5 years old	New Station: - Surabaja
"SULIRI"		
Type	-trawler	Used for biological investigation
Net tonnage	-10.70 R.T.	of the tuna fishery
Motor type	-National-165 HP full Diesel	Station: - Sorong (formerly) New Station: - Makassar
"LENTJAM"		
Type	-trawler	Used for trawl-explorations and
Net tonnage	-13.97 R.T.	biological research
Motor type	-Kahlenberg-90 HP full Diesel	Station: - Makassar
"LODI"		
Type	-trawler	Used for transport of fishery
Net tonnage	-13.62 R.T.	Materials
Motor type	-Kahlenberg-30/36 HP - full Diesel	Station: - Makassar
"IKAN-MERAH"		
Type	-trawler	Used for fishery explorations
Net tonnage	-7.09 R.T.	
Motor type	-Deutz-Diesel 30 HP full Diesel	Station: - Djakarta

MAP NO. 2

16 OCT. 50



● EXISTING FISHERY

▣ EXISTING FISHERY

▲ PROJECTED FISHERY

× PROJECTED FISHERY

■ ZONE HEADQUARTERS
LOCATED AT SEMARA

SOURCE: SEA FISHE

Technical and Scientific Section

This section is concerned with such matters as the improvement of existing types of fishing gear and methods, the development of new and application of foreign fishing methods, improvement in the design of fishing craft, mechanization of the fishing fleet, explorations of virgin or little known fishing areas and development and improvement of techniques for processing fish. The section also conducts biological studies of fisheries, being concerned now with determining tuna migrations in the eastern seas.

Social and Economic Section

This section is concerned with such matters as fostering and promoting cooperative associations of fishermen, establishing auction markets to sell the fishermen's catch, publishing and disseminating the results of technical and scientific investigations and applying these results to the commercial fishing industry and forming fishery schools. At present, the education of fishery officials has been largely by practical training. This has proved satisfactory for some positions, but more intensive academic training in fishery schools or colleges would be preferable. There is also the need to teach instructors who can impart their knowledge to fishermen, but personnel has not been available to do so.

Sea Fisheries Institute

This Institute is of long standing. It is a corporate body under the direction of a Supervisory Council or Board of Directors. Prior to September 7, 1950, the members of the Board were appointed by the Minister of the Ministry of Economic Affairs. Now that the administration of the sea fisheries is separated from that Ministry, the members of the Board will likely be appointed by the Minister of Agriculture and Fisheries. The Institute is managed by an Administrator, who at the present time is also the Chief of the Sea Fisheries Service. The Administrator is also a member of the Board of Directors of the Institute.

The work of the members of the executive staff of the Institute is directed by the Administrator. Because of the shortage of personnel, many of the members of the executive staff are also on the staff of the Sea Fisheries Service. This is proving a hardship on these people, because the work of the Service and the Institute has increased considerably in recent months. It is unlikely that this situation will improve in the near future, since many Dutch fishery experts who are in the Service and and the Institute holding dual positions are leaving Indonesia. It is understood that about one-half of the staff of about ten Dutch workers in the Makassar station have returned to Holland. Qualified Indonesian personnel are not yet available to replace them.

Fishery Service Stations

The Institute operates a series of stations to service fishing fleets, as mentioned previously. These also serve as bases for exploratory and technical researches of the Sea Fisheries Service. Such stations are located at Djakarta on Java, at Makassar and Aertembaga on Celebes, at Ambon on Ambon Island, and at Sorong on New Guinea.

The station at Djakarta was in operation before the war and is located at the harbor of old Batavia next to the headquarters of the Sea Fisheries Service and near the Laboratory for Investigation of the Sea and the Fish Auction Market and the wharf. It is equipped with slips and machine shops, and other workshops to repair or build fishing craft up to 100 or more feet long. It also has a warehouse for storing imported fishing materials.

The station at Makassar, opened in 1946, housed the activities of the main station at Djakarta during the unrest in Java after the Japanese surrender. It has workshops but no slips. There is also a yard for salting fish and a warehouse.

The station at Aertembaga, opened in 1946, was established to serve as a base for a tuna fishery. It covers a considerable area and has slips, workshops and warehouses, an administration building, and living quarters. Space is available to erect a tuna cannery.

The station at Ambon, opened also in 1946, was built to serve the fishing industry in the Molucca area. It is equipped with slips and workshops.

The station at Sorong was opened late in 1948. It is not large, having been built primarily as a base for exploring tuna fisheries in the surrounding waters. If these explorations result in developing a commercial tuna fishery nearby, the station will be enlarged to serve the tuna fleet. Otherwise, the station will be moved to a more favorable location.

Other stations are projected. These will be located respectively at Surabaja, Pontianak, Koetaradja and Bengkalis. The station at Surabaja in Java will be used as a base by the Sea Fisheries Service to conduct experiments in mid-winter trawling in the waters off the Island of Madura and along the southern coast of Borneo. A species of fish called "kembung" especially will be sought. It is used for making a fish paste which is in great demand in the markets of Java. In some of the years before the war, Java imported as much as 50,000 metric tons of this product - constituting some 50 percent of the imports of all fishery products into the Island.

The sea off the south coast of Borneo is especially rich in kembung as well as other fishery resources. This is said to be due to favorable conditions produced off the coast by the mixing of water moving

west from the deep Flores Sea with the water of the relatively shallow Java Sea. However, while fish are abundant in this area, the fishery resources are practically untapped. This is probably due to the fact that the area is rather distant from the fishing ports of northern Java, to the small size of the fishing boats and their general lack of motors, and unfamiliarity with methods for prosecuting the fisheries.

The station at Surabaja will also serve as a base to investigate the sardine fishery in Bali Strait. This fishery has been very erratic. Normally the season extends from October to December when the fish are migrating north through Bali Strait from the Indian Ocean to the Java Sea. For three or four consecutive years the runs are very heavy and then during the next few successive years they prove a failure. A plant was established in 1939 at Muntjang on Java near the fishing grounds to can this fish, but it had to be abandoned in 1941 because of this situation.

At the time when the sardines are abundant, they appear very close to shore and can be caught easily with practically any type of net, such as haul seines and beach seines. During the years of poor runs the fish are said to be still in the vicinity but far off shore, out of reach of the small sailing vessels normally used in the fishery. During the years when fish are scarce some fishing is done inshore at night with lights suspended over the surface of the water to attract the fish. The fish are then captured with a net thrown around the school. While this method of fishing is sucessful, it is not very productive.

Investigations proposed for the station at Surabaja would include studies to determine whether purse-seine vessels would prove effective in catching sardines in the off-shore waters, say north and south of Bali Strait, during the so-called "lean" years, when the fish do not occur close to shore. Concurrently, biological studies would also be conducted to learn whether it would be possible to predict the size of the sardine populations from year to year. Such predictions could be used as a basis for outfitting the fishing boats and plants for canning the fish.

It is also proposed to establish a station at Pontianak on the west coast of Borneo. The waters in this area are said to be very rich in fish, due to the mixing of water moving north out of the Java Sea with water coming south from the South China Sea. From this station, the Service will conduct exploratory studies to determine the value of mid-water trawls and seines in capturing kembung. In addition, experiments will be made in trolling for tuna in the waters between Borneo and the Malay peninsula.

Up to this time the fishing grounds off west Borneo have been little worked by Indonesian vessels. This is due largely to the fact that motor vessels capable of bringing the catch to markets in Java in fresh condition are not in operation. Furthermore, the local fisheries

have been little developed. In contrast to this, it is interesting to note that the grounds off Borneo are fished by boats from Siam for a type of kembung used in Siam for making "pedah kembung". In pre-war years, this was exported to Java in large quantities.

It is also planned to locate a station at Koetaradja on the northwest tip of Sumatra to explore for tuna in the waters to the west and north.

A station is also proposed for Bengkalis on Sumatra. From here, studies would be conducted by the Service to improve methods in existing fisheries and develop new ones. The station would also service the extensive fishing fleets in the area, such as that engaged in catching a miscellaneous assortment of small fish on the delta of the Rokan River. According to fishery experts in Java, this fishery has developed into one of the most productive, per square mile of area fished, of any in the world. Annual catches here reached 80,000 metric tons of fish.

This station will also conduct studies on this fishery, which in recent years has become less productive. This is said to be due, not to overfishing, but to a shift in currents brought about by a change in the configuration of the delta. As the delta continues to enlarge, the off shore currents, which formerly came into the bay at the mouth of the river making favorable conditions for fish life, now tend to bypass the mouth of the River, and disperse the fish over a wider area and farther off shore. This has made it more difficult to catch the fish with the large traps formerly used along shore; some of which had wings over 500 meters long.

The work at the present station at Djakarta would be expanded to include tuna explorations in Sunda Strait between Java and Sumatra and off West Sumatra. Concurrently, trials will be made in using various types of fishing gear for capturing tuna.

Secondary stations are projected at Cheribon, Semarang and Tjilatjap on Java and at Padang on Sumatra. These will service existing majang fishing fleets.

Each of the projected main stations would have a slip, workshops, warehouses, an administration building and residence if necessary. Those in areas far from Djakarta would have biological laboratories and equipment for studies in fish processing. It is estimated each station would cost between 200,000 to 1,000,000 rupiahs, depending upon its equipment, and employ 30 to 100 persons. They would be financed entirely by the Indonesian Government, although some aid may be needed for scientific apparatus.

Fishery Development

The Institute also serves as the operational arm of the Sea

Fisheries Service in developing new fishery enterprises. Risk capital for these ventures is supplied by the Government. Once these enterprises prove successful and profitable, they are sold to fishery cooperatives or individual fishermen. In this connection the Institute has financed the construction of buildings to accommodate fish auction markets and offices of cooperative associations at a number of primary fishing ports, as well as the construction and importation of fishing craft. The Institute is also purchasing abroad such fishing supplies as engines, cotton yarn and twine, and hooks for selling to fishermen.

The Institute makes sales for cash or credit. Those made on credit are settled by deducting a stated percentage from the receipts for the sale of each lot of fish sold by the debtor on the auction or other markets. Interest on deferred payments is at the rate of seven percent per year. On capital goods, such as a vessel, credit may be extended over a period of seven years. On consumer goods, such as yarn and twine, the period is shorter. The Institute has experienced practically 100 percent payment for sales made on credit. Exceptions have been with some of the sales of yarn and twine made early after the Japanese surrender.

Laboratory For Investigation of the Sea

A laboratory for investigation of the sea was established in 1904. It is now located at Pasar Ikan in old Batavia harbor, in buildings erected in 1919. Later an aquarium was built next door. The laboratory was originally established for commercial fishery research, but through a private gift some years ago purely scientific work also is carried on.

The laboratory and its competent staff are under the administration of the Botanical Gardens at Buitenzorg (Bogor). The staff maintains close relations with the Sea Fisheries Service and Sea Fisheries Institute and other government agencies concerned with the sea. Pioneer work has been done in carrying forward the work of ichthyologists on the taxonomy of Malayian fishes. Other problems tackled have concerned plankton research, pelagic fish eggs, bottom configuration, and fishery biology.

The buildings of the station at Pasar Ikan suffered some damage during the recent upheavals but they are being repaired as fast as conditions permit. The aquarium was reopened on Christmas 1947, and is attracting many visitors. Research work at the station was resumed in 1947. Research is chiefly on physic-chemical (salinity, oxygen, nutrient salts, temperatures, currents), and biological oceanography (systematics, migration, distribution). This work is proving of assistance to commercial fishermen in locating new fishing areas. Work also is in progress

to locate resources of seaweed in the archipelago suitable for manufacturing agar agar.

The Laboratory operates one small, ill-fitted fishery research vessel, which is on loan from the Sea Fisheries Service. It is proposed to build another vessel. The need for this will be discussed later, as well as the need for laboratory equipment.

Inland Fisheries Services

The Inland Fisheries Service is administered through the Agricultural Extension Service of the Agricultural Service of the Ministry of Agriculture and Fisheries. It may later be coordinated with the Sea Fisheries Service. A laboratory for Inland Fishery Research is administered through the General Experiment Station for Agriculture of the Agricultural Service. The staffs of the service and laboratory are experienced and competent.

Inland Fisheries Service

The Inland Fisheries Service, among other things, is concerned with the general administration of lake, river, swamp, and pond fisheries, the operation of some 40 hatcheries to breed brackish and fresh-water fish, collection and distribution of fish eggs and fry, offering technical assistance in the maintenance and rehabilitation of fish ponds, dissemination of information on pond culture and extension service for pond culturists, exploring virgin inland waters to develop fisheries, introduction of exotic species in the fresh and brackish waters, testing new fishing methods and substitute fishery materials, improving techniques for preserving fresh and brackish water fishes, distributing imported fishing supplies (twine, hooks, etc.), promoting cooperative associations among inland fishermen, and encouraging the conservation of inland fisheries.

Laboratory for Inland Fisheries Research

The Laboratory for Inland Fisheries Research was established in 1930. It is located at Buitenzorg. Formerly, this was a well equipped laboratory, but during the war the laboratory building was badly damaged and most of its equipment and library have been lost. There is a branch of the Laboratory at Makassar. There is a need for equipment at these laboratories. This will be discussed later.

The work of the laboratory is aimed at determining the factors which will contribute to an increased fish production so as to improve the protein diet of the population. The more important researches include the following: - the most economic population-density in fishponds, the introduction of fish in new and fertile habitats (the introduction in 1937 of the "tawes" and "sepat Siam" in Temple-Lake on Celebes was the cause of an enormous increase in fish production), work to spread the introduction

of the "ikan mudjair" from Africa, the optimum conditions for raising "bandeng" and "ikan mudjair" in brackish ponds, with special study on the malaria danger caused by these ponds, and the cultivation of fish in rice paddies. The latter work has already shown a beneficial effect on increasing rice production.

In order to conduct these studies on a practical scale, the Laboratory maintains a series of fishpond complexes in various parts of the Islands. Here, under controlled conditions with respect to the size of pond, depth of water, type of aquatic plants, salinity, and other factors these researches are conducted. The general layout of such a complex near Djakarta is shown in Map No. 3. This particular complex, which was operated by the Inland Fisheries Service, recently was leased to several Indonesians to operate as a commercial venture.

The administrative staff and research workers of the Inland Fisheries Service and the Laboratory for Inland Fisheries Research work in close cooperation with the staffs of the Sea Fishery Services and Institute and Laboratory for Investigation of the Sea.

Fishery Education

Extension Work

Indonesia has no separate schools for teaching fisheries subjects, either at the higher or lower levels. However, since many farmers are also fishermen, the agriculture extension service of the government aims to instruct in both agriculture and fisheries. In order to develop extension workers somewhat competent in the latter field, some courses in fisheries are given in the primary and secondary agriculture schools.

Students are eligible to enter the primary agriculture colleges after 8 years of primary and grammar school. The course is of two years duration and is for the purpose of teaching extension workers at the village level of the government extension service.

Students are eligible to enter the secondary agriculture colleges after two years of high school. The course is of three years duration and is for the purpose of teaching extension workers at the county level of the government extension service.

Students electing to pursue the four-year high school course are eligible to enter the University of Indonesia for specialized courses covering a term of five years. No specialized fishery courses are given at this University, but graduates are eligible for positions at the provincial level of the agriculture extension service.

Administrative Work

There is an urgent need for trained administrative personnel

to staff existing commercial fishery organizations, as well as those which will be established as a result of the government's work to expand fisheries. To accomplish this, the Sea Fisheries Service has set up a school to accommodate sixty students. The course is for a term of one year.

During the first six months of the course, the students are given practical training in bookkeeping and village-bank administration. This is given by personnel from the Indonesian People's Credit Bank. During the second six months, the students are given instruction in the management of fishery organizations with the aid of the Government Co-operative Service.

Mechanical Work

There are also plans to open a school for training motor drivers and mechanics to assist in operating and servicing the motor vehicles to be imported for shipping fishery products and a school to teach engineers in the operation and maintenance of marine motors.

Cooperation With Indo-Pacific Fisheries Council

The fishery services and fishery research laboratories of Indonesia work in close cooperation with the Indo-Pacific Fisheries Council of the United Nation's Food and Agriculture Organization. Administrators and research workers from these agencies have attended all the meetings of the Council since its organization several years ago and have participated freely in the proceedings. Furthermore, a number of recommendations of the Council have been implemented by these agencies. For instance, several pamphlets have been published describing important fishing methods in Indonesia, and some of the Republic's fishery research programs have been reoriented so as to coordinate these with those being carried on by other countries in the Indo-Pacific Council.

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III FISHERIES PROGRAMS

General

In keeping with programs initiated in 1939, the Indonesian Government, since the Japanese surrender, has carried forward its work to motorize the fishing fleet and modernize the fishery and to develop new fisheries based on latent resources. This work has been impeded somewhat because of unrest and unsettled conditions in some sectors of the country, first in the west and later in the east. Nevertheless, real and substantial progress has been made in several instances. This has encouraged the development of further plans to carry on more intensive work in these fields. These look to a rapid increase in fish production and, if carried forward, will be of direct benefit to a large group of people both from the standpoint of those engaged in the fishing industry as well as consumers of fish.

Background on Efforts to Motorize the Fishing Fleet

In 1947 the boat-building part of the general fisheries program was tied in with a program to build a fleet of small cargo vessels for carrying copra from various collecting stations in the South Pacific to large concentration ports. As a part of this program, a shipyard was built at Buton on Buton Island, located to the southeast of the southeastern peninsula of Celebes. This site was selected so as to be removed from the unrest in the west and be near teakwood forests on Moena Island nearby.

The shipyard was equipped with modern machinery manufactured in the United States. However, because of strikes in the factories manufacturing the machinery, transport problems in getting the machinery to Indonesia, sabotage at the yard, such as dropping and breaking a large saw which had to be replaced by another from the United States, and other troubles, the yard did not get into operation until late 1948. At that time the keel of a tuna-fishing vessel was laid. But soon labor troubles ensued and this vessel was not completed until the middle of 1949. It was the only vessel ever built by the yard. By this time in 1949 unrest in western Indonesia had subsided and shipyards were reopening on Java, closer to a labor supply and better teakwood forests. In view of this it became evident that a shipyard was not needed at Buton and it was closed. Its machinery and equipment was distributed among the Sea Fisheries Institute and various other Government agencies.

However, in 1947, shortly after it was decided to build the shipyard at Buton, the Sea Fisheries Institute placed a rather large order for marine engines with a firm in The Netherlands. Delivery was to be effected over three years. These engines were to range in size from 20 to 120 HP and were to be installed mainly in vessels to have been built at Buton. The bulk of these engines have now been delivered and it is expected the remainder will arrive by the end of 1950. They are financed with funds appropriated by the Government to the Sea Fisheries Institute.

With the closing of the shipyard at Buton in 1949, the Sea Fisheries Institute then made plans to build the fishing vessels at yards in Java. But no sooner had the plans been drawn than the price of teakwood in Java soared to such heights that its cost became prohibitive for building fishing vessels. An effort was then made to build vessels with steel hulls and an order for six such vessels was placed with the Surabaja Shipyard Company which had facilities to build vessels of this type. But because of labor troubles and the rush of other work, the order was not accepted. As a consequence of all these difficulties and the fact that conditions are now unsettled in Celebes and in other parts of eastern Indonesia, all of the motors so far delivered are on hand except ten of the 120 HP which have been sold to private interests, and one which was installed in the tuna vessel built at Buton. The inventory as of October 1, 1950 stood as follows:

No. of Motors	HP
5	120
10	80
5	60
6	40
22	20
Total 48	

Now that conditions are more normal on Java it will be possible to go ahead with the building of fishing vessels. The price of teakwood also has come down, making it economical to use this lumber. There is no lack of shipbuilding facilities. In view of this situation, the motors on hand will be used for the following purposes. The five motors of 120 HP will be used as replacements in five of the research vessels owned by the Sea Fisheries Service; those of 80 HP for motorizing vessels in the reef fishery; those of 60 HP to install in new vessels to be built; four of those of 40 HP will be installed in carriers and two as replacements in vessels based at the fishery station at Aertembaga; and the twenty-two of 20 HP will be installed in majang vessels.

Majang Fishing Fleet

There are plans to build abroad sixty small majang fishing vessels. These will be used in the Java Sea. They will be about 35 feet long and be propelled by 15-20 HP motors. This size and type of

vessel will enable operations in the offshore waters on voyages of three or four days' duration. Ice would be carried on these voyages to refrigerate the catch. Sufficient ice is available at Djakarat, Semarang, and Tegal on Java and at Pontianak on Borneo, where it is planned to allocate these vessels. Fishing craft have priority in obtaining ice at these ports; which costs around 3.50 rupiahs per block of 50 kilograms (about 50 U. S. cents per 110 pounds). It is planned to assign the imported vessels to these harbors as follows:

	Number
Djakarta	25
Semarang	10
Tegal	10
Pontianak	15

There are twenty-six motorized majang fishing vessels of around 35 feet in length operating from Djakarta at present, and the Sea Fisheries Service believes that this port can easily service and handle the catch of twenty-five more vessels of this type. Similarly, Semarang and Tegal can handle the vessels allocated to these ports. As the possibilities for fishing out of Pontianak are not definitely known, only three vessels would be assigned there at first. If they prove successful, twelve more would be allocated there later. The landings of fish at Pontianak would be salted and dried there for shipment to Java. Fish caught by vessels fishing out of Pontianak might be salted aboard, thus precluding the need for ice on the fishing voyage.

It is also planned to import one hundred small marine engines of 7 to 20 HP. Of these, forty would be of 7 HP and sixty of 15 to 20 HP.

Forty of the 15 to 20 HP size will be used for installing in 35-foot vessels of the majang type, and as an experiment, twenty would be installed in 35-foot carrier vessels as an aid to sailing majangs operating near shore. If this experiment proves uneconomical, these carriers will be converted to majang vessels. These would be built in Indonesia where boatbuilding facilities are very good. In addition, the Sea Fisheries Institute has twenty-two motors of 20 HP on hand, as mentioned previously. These are being installed as rapidly as possible in majang vessels of the 35-foot size which are building in Java.

The forty motors of the 7 HP size are to be installed in 35-foot majang-type sailing vessels as auxilliary power. These will be built in Indonesia. It is expected that these vessels can operate as fishing or carrier vessels as the situation dictates. These vessels would have flat bottoms so as to navigate shallow waters.

Upon concluding the program to motorize the majang fishing fleet, it would contain one hundred twenty-two new 35-foot vessels of 15 to 20 HP distributed as follows:

	Number
New vessels to be imported	60
New vessels incorporating motors on hand, built in Indonesia	22
New vessels incorporating imported motors, built in Indonesia	40
Total	122

The Sea Fisheries Service estimates that each of the 122 majang vessels will catch 50 metric tons of fish annually, or a total of 6,100 metric tons. The Service also estimates that each of the forty combination sail and motor vessels with the 7 HP engines will catch 40 metric tons annually, or a total of 1,600 metric tons. By using the twenty carriers of 35-feet with the 15 to 20 HP motors, the landings would be increased by about 75 metric tons per vessel anmually, or a total of 1,500 tons annually. (This latter estimate may be too high.)

In sum then, the catch by the majang fleet would be increased as follows:

	M.T.
From the 122 majang fishing vessels of 15 to 20 HP	6,100
From the 40 combination sail and motor vessels with 7 HP engines	1,600
From use of 20 carrier vessels with 15 to 20 HP engines	1,500
Total	9,200

According to the Sea Fisheries Service, there is no need to increase ice-making facilities to supply the added majang vessels or to refrigerate the increased landings of fish resulting from their operations. This is due to the fact that a considerable portion of the landings of fish by the majang fleet is salted on board or salted and dried at the fishing port, except at Djakarta where fresh fish is readily and quickly marketed without the use of much ice.

The Sea Fisheries Service estimates the sixty majang vessels will cost $380,000 and the one hundred motors $220,000.

Carrier Vessels

The Sea Fisheries Service has estimated the need of ten carrier vessels of 50 to 100 tons to be built abroad. They would be built over a period of five years. Two are scheduled for building in 1951 and two in each of the four succeeding years. These vessels would be 18 to 20 meters long, beam 5 meters, and draft 2.3 meters. They would be powered with 60 to 80 HP motors. The hull would be of steel. It is estimated that two vessels will cost $44,000. In utility, these vessels are really of the otter-trawl type, but as they would be used as carriers they would not be outfitted with winches and other trawling gear.

One of the two carriers of around 100 gross tons programmed for 1951 would be used to carry fish from ports on southeast Borneo to Kotabara, Borneo. From there the fish would be carried to Surabaja, Java, by regularly scheduled packets. The other vessel scheduled for 1951 would be used to collect fish at ports on the Paternoster and Postiljon Islands to Makassar. From there they would be carried to Surabaja. It has been estimated that the use of these two vessels should add 2,000 metric tons annually to the Java fish supply.

These vessels would be imported and operated by the Sea Fisheries Institute as a public service. They would assist greatly in providing a market for fish from out-of-the-way places where existing fishing gear is capable of making much larger catches of fish.

It was originally planned to import an additional twenty carrier vessels of 10 to 20 tons at a cost of $320,000. These would now be replaced with twenty such craft which will be built in Java with twenty of the 15 to 20 HP motors to be imported, as was discussed previously.

Bonito Fishing Fleet

In April 1950, the Sea Fisheries Institute planned the importation of twenty new small hook and line bonito fishing vessels at a total cost of $320,000. These vessels would be about 21 meters long, beam 3.5 meters, and depth 1.75 meters. They would have 80 HP motors and a burden of twenty gross tons.

Five of these vessels are already building at the Shioyama Dockyard Company, Osaka, Japan.

The Sea Fisheries Institute plans to go forward with building the remainder. These, along with the five vessels building, would operate out of the ports of Aertembaga and Ternate and fish in the coastal waters of the Celebes and Molucca Islands of the Molucca and Celebes Seas. It is estimated that each of these vessels will catch 330 metric tons of fish annually. This would consist mainly of bonito (skipjack), although some yellowfin tuna will likely be caught.

These vessels would be imported and operated by the Sea Fisheries Institute. After operations prove profitable, they will be sold to private interests. It is estimated the fifteen vessels will cost about $255,000.

The possibilities for establishing a rather large bonito and tuna fishery in Indonesian waters seem promising. In this connection, it has been reported that the Japanese tuna expedition, operating with a 10,000-ton refrigerated mother vessel in waters a little north of where the Indonesians plan to fish, processed 724,000 pounds of yellow-fin tuna in the round during the period of about one month, June 18 to July 15, 1950. In addition, 1,015,016 pounds of other tuna and marlin and shark, mostly in fillet form, were frozen aboard the mother ship. When the twenty new bonito vessels are added to the fourteen vessels in the tuna fleet by 1951 it is estimated that the thirty-four vessels will produce annually at the following rate:

	M.T.
Vessels in the existing fleet, 14	4,620
Vessels building, 5	1,650
Vessels programmed, 15	4,950
Total	11,220

Tuna Cannery

The Sea Fisheries Service also had plans to erect a tuna cannery at Aertembaga at a cost of $260,000. It was planned to build this cannery in 1951 so as to be ready to handle part of the catch of the twenty bonito fishing vessels originally proposed and which would be delivered early in 1951. It was planned that the output of the cannery would be marketed in Java and the other Islands of the Republic.

There is some doubt now with the Sea Fisheries Service as to whether a plant for processing tuna at Aertembaga should be a cannery or a freezing plant. It was mentioned to members of the staff of the Service that the market in Java may find the price of the canned tuna too high to absorb the output and that if exported it may face a rather high tariff barrier, especially in the United States. Furthermore, there would be a continual need for foreign exchange to buy tin plate and other imported supplies, and an experienced cannery crew would also be needed. In contrast to this, it was mentioned that frozen tuna is admitted free of duty in the United States, and that a good market exists there for this product. Furthermore, experience in fishing for tuna on a large scale in Indonesian waters may indicate the need for carrying ice on the fishing voyage. In this event, ice plants would be needed anyway at Aertembaga and Ternate and other ports to service the fleet. The need for the cannery or a freezing plant will require

further study. Since the Ministry of Trade and Industry has administration over freezing and cold storage plants, the Sea Fisheries Service will discuss this problem with them.

Tuna Clippers

The Sea Fisheries Service had planned the importation of four large tuna clippers, of the bait-boat type, at a total cost of $400,000. These would be about 28 meters long and have a burden of about 75 net tons. Specifications are not available. These vessels were to be used by the Service for exploratory purposes in locating tuna.

It was planned to inaugurate this program in 1952 with one vessel and then add another vessel in each of the three succeeding years. It is likely this program will be delayed until the usefulness is demonstrated of the twenty small bonito vessels on order and programmed.

Yarn and Twine

Soon after the Japanese surrender the Indonesian Government, through the Sea Fisheries Institute and the Inland Fisheries Service, embarked upon a program to import yarn and twine for selling direct to fishermen for making nets and other textile gear. This program was instituted because unsettled conditions prevented private importers from carrying on the trade. The program is still in progress and during the current year the Institute expects to import 150 metric tons of cotton yarn and 250 metric tons of cotton twine for the sea fisheries. In addition, 30 metric tons of yarn and 400 metric tons of twine will be imported by the Inland Fisheries Service. These amounts approximately represent the annual requirements for such items by the sea and inland fisheries.

The supplier is Apeldoornsche Nettenfabriek of Holland. Payment already has been made for the entire amount in Dutch guilders with funds appropriated by the Government. It is expected that delivery on the entire order will be completed by the end of 1950. Prices for the yarn have averaged around four to five Dutch guilders per kilogram and nine to ten Dutch guilders per kilogram for the twine.

Subsequent to the time the 1950 order was placed, the Indonesian Government put the importation of yarn on the free list. Private importers then entered the trade, selling the yarn at the same price as that imported by the Government. Since it is apparently easier now for the fishermen to buy from the importers, stocks of yarn are accumulating in the hands of the Institute, but the Inland Fisheries Service has disposed of its imports of this item. As of October 1, 1950, the Institute had an inventory of about 65 metric tons of yarn.

Twine is not on the free list, but after the new currency regulations were put into effect in March 1950, the Indonesian rupiah was "devalued" in relation to the Dutch guilder, the effective new buying rate being three to one instead of one to one as previously. This has resulted in raising the price of the imported twine from around ten Dutch guilders to thirty rupiahs per kilogram.

Prior to the new currency regulations, the imported twine was sold to sea fishermen at varying prices, depending upon the ability of the fishermen to pay. In general, though, it was the practice to sell the twine at a rather high price, up to 25 or more rupiahs per kilogram. This was done to equalize losses and to discourage black market buyers from unbraiding the twine into yarn. Such yarn could be sold for 50 to 60 rupiahs per kilogram for making cloth for sarongs and other clothing. When yarn was put on the free list, this practice was discouraged, as the price of yarn went down to 16 rupiahs per kilogram.

The Inland Fisheries Service sold their twine to the inland fishermen for a lower price than the Institute, ranging around 15 rupiahs per kilogram to the local extension offices. These offices then sold for around 17 to 18 rupiahs per kilogram to the inland fishermen.

Because of the new currency regulations, the twine must now be sold at a price of 35 to 40 or more rupiahs per kilogram compared with the high of around 25 rupiahs formerly. Fishermen, except possibly those in Djakarta who sell their fish for rather high prices, seem unable to buy at this price. Therefore, the majority of the fishermen are buying yarn through commercial channels and twisting their own twine by hand. Apparently this will be a satisfactory solution for securing twine to repair nets. But the fishery services believe that only manufactured twine is strong enough for new nets; and when it is time to re-outfit for the next season the twine will find a market for this purpose.

The situation was further complicated because of unsettled conditions in eastern Indonesia. This area requires about 100 metric tons of yarn annually for a mill at Makassar to manufacture into twine and 100 metric tons of twine per year for the fishermen to weave into nets. Due to unrest in this area, only 20 metric tons of yarn and no twine had been sent there from Djakarta during the first nine months of 1950.

Upon arrival of the yarn and twine in Java, the Sea Fisheries Institute and Inland Fisheries Service take physical possession of their respective shares and store it in their respective warehouses. The Institute then distributes its stocks through its district offices which are supplied from Djakarta and Makassar. The Inland Fisheries Service makes distribution through the offices of the Extension Service. Sales are made to fishermen direct, or to cooperative associations of fishermen which in turn sell to their members.

Early after the war much of the imported yarn and twine was sold on credit. But as conditions improved, more and more fishermen have found it possible to buy for cash. As related above, however, the yarn and twine held by the Institute and the twine held by the Inland Fisheries Service were not moving into consumption. Whether this is due entirely to its high price and unsettled conditions in eastern Indonesia, it is not definitely known. At any rate, the Financial and Economic Council of the Government is giving this problem careful study. Possibilities for reducing the price at which the yarn and twine is sold to the fishermen will be explored. It might be possible to reduce the price if the monetary regulations exempted the Institute and Inland Fisheries Service from paying for the foreign exchange certificate for the imported yarn and twine. In this connection, it is understood that exemptions have already been made for imported medicines and books.

The question had not yet been resolved in October 1950. Meanwhile, stocks continue to accumulate in the warehouses and as of October 1, 1950, the Institute had an inventory of 50 metric tons of twine and the Inland Fisheries had some 175 metric tons. In addition, much larger amounts on the 1950 order, which are already paid for, are still due to arrive in Java. In view of this, the Sea Fisheries Service was of the opinion that decision as to the import needs of yarn and twine for sea fishermen, beyond the amount of the 1950 order, can be deferred, and the Inland Fisheries Service believed likewise.

Motor Trucks

The increased production of fish envisaged by the fishery program will throw an added burden on the facilities for transporting fish from the landing port to market. The Sea Fisheries Service has considered this problem in detail and programmed the importation of eighty motor trucks during the next several years. Of these, it is planned to import forty-five in 1950. They will be financed with funds from the recent Export-Import Bank loan. The remainder also will likely be financed through this loan.

The trucks to be imported in 1950 will be allocated as follows:

1. For the transport of fish from the port of landing to consuming centers (5-ton trucks)

	Number
Banjuwangi - Djember	2
Surabaja - Malang	3
Semarang - Djokja, Solo	5
Tjirebon - Bandung	5
Banten - Djakarta	2
Tandj. Balai - Medan, Siantar	4
Belawan - Medan	1
Bulu - Makassar	1
Pare-Pare - Makassar	2
Menado - Tomohon, Tondano	1
Aertembaga - Menado, Tomohon	3
Liang - Amboina	1
Total	30

2. For the transport of fish from fish market places to processors (1-ton trucks)

	Number
Djakarta	2
Makassar	1
Aertembaga (Minahasa)	1
Halong (Ambon)	1
Total	5

3. For local distribution intra-city (Pick-up, jeep type)

Surabaja	2
Semarang	2
Tjirebon	1
Djakarta	2
Medan	1
Makassar	1
Ambon	1
Total	10
Grand Total	45

Vessel for Investigation of the Sea

The fishery program of Indonesia includes the importation of a fishery research vessel at a cost of about $130,000. The vessel would be imported by the Department of Shipping and Navigation of the Ministry of Transportation for the use of the Laboratory for Investigation of the Sea.

The vessel would have a steel hull with double bottom, measure about 35 meters over-all length, and have a maximum draught of about 2 meters. It would have a cruising speed of 12 miles per hour and a range of 6,000 miles. There should be accommodations for twenty-one officers and crew of eight research workers, laboratory space, and a cargo hold for storing scientific equipment. In general design it would be similar to one of the twelve patrol boats recently ordered by Indonesia from a shipbuilding firm in Holland.

At the time of the survey the Laboratory for Investigation of the Sea had no research vessel of its own to carry on its work. There is need, therefore, for a properly fitted vessel to carry forward the important oceanographic studies now in progress and which have already resulted in locating new fishing areas. The vessel will be put to good use by the very capable research staff of the laboratory.

Laboratory Equipment

As a result of military action in Indonesia, much of the scientific equipment in the several fishery research laboratories of the country was destroyed or fell into a state of disrepair. In view of this, the government has programmed the importation of replacements for this equipment, and in addition several types of scientific apparatus to carry forward long-range fishery research projects. These replacements and additions are necessary if the laboratories are to function efficiently. About $25,000 is programmed for this purpose.

Of this amount, some $15,000 would be used by the Inland Fisheries Service to procure such items as water sampling apparatus, temperature and salinity recorders, microscopes, plankton recorders, and pilot plants for canning and drying fish and for the manufacture of fish meal. Some dredging and earthmoving equipment also may be obtained to help in the development of fish ponds.

The remainder, $10,000, would be used by the Laboratory for Investigation of the Sea to purchase such equipment as Spekker absorptiometer, bathythermograph complete with winch, echosounder, oceanographic winch, electric H.P. meter, electric water still, electric hot air stove and refrigeration equipment to experiment in manufacturing agar agar.

Technical Assistance

The problem of providing technical assistance to the fishery industry of Indonesia requires further study to determine where or how it should be directed. There is certainly a need for training Indonesians in the technical and scientific aspects of the fisheries and fishery industries so as to provide replacements for the European workers in this field who plan to leave the Islands, as well as qualified personnel to staff the fishery stations of the Sea Fisheries Service, present and proposed. Competent replacements, however, will have to be trained over a period of years; in other words, they will have to pass through a regular college course of four or more years. At the present time, it even may be difficult to obtain suitable applicants for receiving such college training. A group of teacher-trainers working with high school teachers in Indonesia might help in this respect. Also, it might be possible to set up a few fishery schools at the high school level. As mentioned at the outset of this section, the problem of technical assistance must be given further study before any conclusions can be drawn in this connection.

IV SUMMARY AND RECOMMENDATIONS

Summary

The fishing industry of Indonesia is important in providing food for the population and work for the people. In 1949, the some one million fishermen in the industry produced about 420,000 metric tons of

fish. This is considerably less than production during the immediate prewar years. In addition, imports of fishery products have declined to small proportions during the post-war years. As a consequence, the fish supply for Java, the principal Island deficient in fish, amounted to only 3.6 kilograms per capita in 1949 compared with 6.7 kilograms in 1940. The supply in 1940 was considered more or less "normal", but even then was much below that of many European maritime countries.

Fish constitutes the principal animal protein food in Indonesia. Because of this, and in view of the short supply in recent years, the government has inaugurated a program to aid the fishing industry. This has had as its objectives an increase in the production of fish and improvement in the living standards of those engaged in the industry. Further, it is hoped that a modern fishing industry would serve as a training ground for engineers and deckhands for later employment in an Indonesian merchant marine. It is planned to reach these objectives by motorizing more of the vessels in the fishing fleet, by developing latent fishery resources in the Indonesian archipelago, by establishing a fleet of carrier vessels for the sea transport of fish and a fleet of motor trucks for the land transport of this product, by establishing plants for processing fish, and by making available to the industry cotton twine, hooks, and other fishing implements which have been in short supply in the Republic.

In the main, this is a well-rounded program and should result in attaining the objectives desired. This is especially true since it is believed that the fishery resources of Indonesia seem of sufficient magnitude to sustain annual catches far above those now taken and thus can become the basis of an industry of considerable importance. Furthermore, the government fishery administrative agencies seem capable of handling the importation and distribution of items not on the free list covered in the program.

Recommendations

Projects for Immediate Action

Majang Fishery.—In view of the pressing need to motorize the majang fishing fleet, the importation of sixty complete majang motor vessels is justified as well as the importation of forty marine engines of 7 HP and sixty of 15 to 20 HP together with spare parts for one year's normal operation. The forty engines of 7 HP would be installed in 35-foot sailing majangs as auxilliary power. Forty of the 15 to 20 HP engines would be installed in new 35-foot majang vessels and twenty in 35-foot carrier vessels. All the vessels using imported motors would be built in Indonesia where there are many shipyards capable of building vessels of these types.

Bonito Fishery.—Indonesia is especially interested in developing a bonito and tuna fishery. Possibilities for doing this have already seemed so favorable that five of the twenty tuna vessels of 20 tons

originally programmed have already been ordered from Japan by the Sea Fisheries Institute. The importation of the remaining fifteen vessels also is justified. The latent tuna resources in the archipelago seem of sufficient magnitude not only to support these but additional vessels of this sort as well.

Carrier Vessels.--Carrier vessels are needed to collect and transport fish from outlying areas to Java or other islands. By their use, fish production could be increased with present fishing gear in areas abundant in fish, but lacking in markets. The fishery program of the government includes the procurement of ten carrier vessels of up to 100 tons, two each year over a period of five years. This program has merit and the procurement of two in 1951 is justified. These vessels will be operated by the Indonesian Government as a public service, but may eventually be sold to a private concern.

Twenty additional carrier vessels of 10 to 20 tons were originally programmed at a cost of $320,000. These are not needed now as they will be replaced with twenty such vessels built in Indonesia with twenty of the motors to be imported.

Research Facilities.--The Laboratory for Investigation of the Sea has planned to import a research vessel to carry forward oceanographic work, which already has resulted in the development of new fisheries. The need for this vessel is justified.

The fishery research laboratories of Indonesia also are in need of certain scientific and technical equipment to further the development of fisheries. This will be used to replace equipment destroyed by military action as well as in new research studies.

Motor Vehicles.--The Indonesian Government has programmed the importation of eighty motor vehicles for transporting fish. Of the total, forty-five are being imported. The remainder are needed. These are being financed by an Export-Import Bank loan.

Projects for Future Action

Majang Fishery and Carrier Vessels.--The program for motorizing the majang fishing fleet should be kept under study to determine whether more completed vessels or motors for craft to be built in Indonesia should be imported for fishing from Sumatra and several of the other islands as well as Java.

Similarly, the project for developing a carrier service for fish should be given further study to determine the type and kind of vessels which should be added to this fleet during 1952.

Tuna Clippers.--The original fishery program of Indonesia included the importation of four large tuna clippers. It was planned that one such vessel would be added to the fleet in each of four successive years, beginning in 1952. Until more is known concerning the extent of the tuna resources in Indonesian waters as a result of the activities of the present and expanded fleet, it is believed that action should be deferred in this direction. However, the tuna fishery should be kept under continuous observation in the next year to determine the need for tuna clippers at some future date.

Tuna Cannery.--A tuna cannery installation was included in the original fishery program. It was expected that this cannery would process a part of the catch of the twenty tuna vessels to be imported. There is a question now, however, as to whether it might be more desirable to substitute a tuna-freezing plant in place of the cannery. No decision has yet been reached by the Sea Fisheries Institute. This problem should receive further study so as to have adequate facilities at the various tuna ports to handle the increased tuna landings expected. At this writing a freezing and cold storage plant seems preferable, especially if it is expected to develop foreign markets for the processed tuna. The United States is a likely market for frozen tuna but not canned tuna, since the frozen product is admitted free of duty and the canned product carries a high ad valorem duty. Also, it may be found that ice will be needed by the tuna vessels on the fishing voyage to keep the catch in prime condition. In this event ice-making plants will be needed anyway at the tuna-fishing ports.

Yarn and Twine.--There will be a continuing need to import cotton yarn and twine to supply the fishing industry. However, stocks of these items are on hand and much larger quantities are to be received before the end of 1950 on an order placed last winter with a firm in Holland. It is believed, therefore, that adequate stocks will exist to supply consumption needs for these items until around July 1951. This problem should be kept under continuous review.

Technical Assistance.--During the survey there was not sufficient time to give this problem the attention it deserves. It should be given detailed study to determine how and where technical assistance best can be directed. If the Sea Fisheries Institute follows through with its program to develop fishery stations, trained personnel will be needed to handle the work at these places.

In this connection also it should be restated that a group of Indonesian students are now receiving in-service training in the administration and operation of public fish auction markets in Indonesia. Those qualified upon completion of the course are given permanent positions with some cooperative association of fishermen. Men of this type might be likely candidates for brief training in the United States in fish marketing methods and techniques. Many of them speak English.

Shore Facilities to Handle Fish.--The Indonesian Government has not given this subject much attention except in regard to a tuna-canning installation. This seems to be due to the fact that it is felt additional shore facilities, such as refrigeration plants, are not needed to preserve the increased landings which are expected to result from the enlarged and motorized majang fishing fleet. Apparently existing ice plants are of sufficient capacity to furnish additional ice if needed. If ice is not available, then the fish would be salted and dried or smoked when necessary to preserve them prior to marketing.

On the other hand, though, a more extensive use of ice on the fishing voyages should result in landing fish of better quality and also reduce loss of fish through spoiling, before the vessels return to port. It is expected that losses of fish through spoilage will be reduced somewhat when the collecting and carrier vessels, as programmed above, are servicing the majang sailing fleet. The problem of refrigeration facilities ashore is not a pressing one, but it should receive detailed consideration in any continuing program to motorize the fishing fleet.

Conclusion

The projects favored above for immediate action would cost $1,054,000 during the fiscal year 1951. If these are carried forward, an increased catch of some 15,000 metric tons should result, most of which would reach Java. Of this, 8,100 metric tons are expected from the motorized majang fleet, 4,950 from the bonito fleet, and 2,000 by the use of the two carrier vessels. This is far below the additional amount needed to bring the fish supply of Java up to the 1940 level, but it is a start in the right direction.

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Note: Following transfer of sovereignty, Indonesia began changing place names in the country from Dutch to Indonesian names, and in some cases the English spelling of the latter have not been made uniform. Therefore, the spelling of the place names here may not agree with the spelling of the same names appearing elsewhere. Both Indonesian and Dutch place names are used in the report, but respective names may not always be uniformly one or the other.

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